# TURTLE MOUNTAIN STUDY
# ARCHIVE INVENTORY

Prepared by

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November, 1983

RESEARCH MANAGEMENT DIVISION
UNEDITED
MATERIAL
O.F. 74

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Attention: Mr. Don Prosser, Project Manager,
Turtle Mountain Study Group

Dear Sir:

Re: Turtle Mountain Study
Archive Inventory

I am pleased to submit the final Turtle Mountain Study; Archive Inventory report.

The report provides a record of sources of information which have been reviewed concerning the Frank Slide, the associated coal mine workings, the geological and geographical setting, and subsequent investigations into the stability of Turtle Mountain.

I trust this report meets the requirements of the Turtle Mountain Study Group and appreciate the opportunity of serving you.

Yours truly,

Heidi Biberhofer, E.I.T.

# ACKNOWLEDGEMENTS

The assistance of D.W. Prosser of Alberta Environment is gratefully appreciated. In addition, I would like to thank the numerous people who have provided information and assistance (The names of the above persons are provided in section 5 of the report).

## ABSTRACT

During Alberta Environment's current study of the stability of Turtle Mountain, it became apparent that information of scientific importance to the study existed in archives and historical records from the time of the slide or shortly thereafter. An inventory of known sources of these records was initiated in 1983 and expanded to include other sources which came to light during the course of the investigation. Material is inventoried by location (file number within the archive) to provide ease of access to the documents by future researchers.

A complete inventory of all sources checked is provided including those which were found to contain no information of scientific interest.

Documents pertinent to the present study are summarized within to inventory or copied and kept in an open file appendix.

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## 1. INTRODUCTION

At 4:10 A.M., on the morning of April 29, 1903, approximately 30 million cubic metres of limestone slid from the east face of Turtle Mountain, located in the Crowsnest Pass in the Front Ranges of the Canadian Rocky Mountains. The southern edge of the town of Frank was buried by the rockslide. Over 75 lives were lost in the hundred seconds that it took for the slide debris to travel over two kilometres across the valley.

Concern over the possibility of further rockslides from Turtle Mountain has led to numerous investigations of its stability. A monitoring network was establish on the cracks at the crest of the mountain in 1932. Alberta Environment is presently upgrading the stability monitoring to take advantage of modern techniques and expanding the network to encompass the entire area of concern.

The present study began with precise on-site measurements of the cracks in the crest of the mountain. Aerophotogrammetric and electronic distance measuring surveys are being conducted and seismic stations are being established at the base of the mountain in the vicinity of the abandoned workings of the Frank coal mine. A detailed geotechnical map of the southeastern portion of the mountain is in preparation.

The archive inventory component of the Turtle Mountain study was initiated to provide an inventory of sources of information concerning the Frank Slide, the associated coal mine workings, the geological and geographical setting and the previous investigations into the mountain's stability. The objective of the archive inventory is to provide present and future researchers with a reference to scientific information relevent to Turtle Mountain.

### 1.2 METHOD

The methodology consisted of three major tasks, the first was to locate sources of information, the second was to review the information and determine its value to the study and the third was to present the findings in such a way that present and future researchers would be able to access the information in a time efficient manner.

There were several known sources of information at the onset of the study. These included the Alberta Provincial Archives, the University of Alberta Archives, the Glenbow Museum, the Energy Resources Conservation Board, and the Geological Survey of Canada. Local accounts and newspaper morgues were also expected to provide some information.

Contact was also made with potential sources such as the previous and existing coal lease holders, historians, the local historic society, persons with past work experience in the coal industry of the area, archives and museums in addition to those known to contain information, and persons exhibiting some interest related to the study.

Each document or piece of information was evaluated for its scientific worth to the Turtle Mountain study. The information sought was that which would assist in any future assessment of the stability of the mountain.

Documents which were found to contain significant valuable information are referenced in sections 2 and 3. In Section 2, documents are listed under location, file number, date, from (in the case of correspondence) or author (in the case of a publication), to (in the former case) and title (in the latter case) and key words or brief description of its contents. Documents which may be of primary interest to present researchers have been photocopied and are provided in the appendices. Many of the documents in the appendices are photo-reductions of second generation xeroxs of carbon copies and are barely legible. The reader may find it necessary to refer to the original in some cases.

Reports dealing specifically with Turtle Mountain and the Frank Slide have been identified and summarized in Section 3. Abstracts, conclusions and/or summaries have been quoted were applicable.

Section 4 inventories sources which do not provide unique and/or scientific information relevent to the Turtle Mountain Study. The above section is provided for completeness and to avoid redundant research of noninformative sources.

Section 5 discusses information provided from other sources such as from local residents of the Crowsnest Pass and from coal mining companies. Mr. Lorry Felske of Oxbow Historial Research Limited was contacted as a possible source of information due to his involvement in other historical studies in the Crowsnest Pass area. A list of references provided by Mr. Felske is included in Section 5.

Due to the nature of the study, many contacts have been made and information discovered in the future is expected to be forwarded to Alberta Environment. It is suggested that additions be made to the appropriate sections of the inventory as new information arrives and as additional sources are researched. The result will be a complete, updated listing of information to be used for continuing research on Turtle Mountain and the Frank Slide.

## 2. INVENTORY OF DOCUMENTS

The following section provides a list of correspondence and articles which provide information pertinent to the Turtle Mountain Study. The most extensive file, file number 77.237 located at the Provincial Archives of Alberta contains mine inspectors reports and correspondence with the Geological Survey of Canada with respect to the stability of Turtle Mountain.

A review of information and mine plans located at the Glenbow Museum resulted in the discovery that the plan of the Frank Mine which has been used as a reference by the Turtle Mountain Study Group is incomplete. The Energy Resources Conservation Board was contacted in this regard and is preparing a complete plan, a copy of which will be forwarded to Alberta Environment. An additional find of interest to the Study Group was a pre-slide topographical map prepared by W.W. Leach of the Geological Survey of Canada (appendix 4).

All of the documents referenced below contain information which is pertinent to the Turtle Mountain Study. Copies of many of the documents are provided in the appendices. Copies of other documents can be obtained from the respective locations by referencing the file number, date, author and description.

File #
77.237/48b

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Apr. 16, 1901 | D. Evans<br>Inspector of Mines | not specified<br>Public Works Department | - very serious condition of the Frank Mine<br>- perpendicular seam, properties of the coal, and mining practices discussed<br>- see appendix 1.1 |
| Apr. 23, 1901 | D. Evans<br>Inspector of Mines | Deputy Commissioner<br>Public Works Department | - "suggestins for remedying the present danger...of the said mine"<br>- see appendix 1.1 |
| Apr. 24, 1901 | Deputy Commissioner | S.W. Gebo, Esq.,<br>Blairmore, Alta. | - communication of report by D. Evans, April 16 |
| May 2, 1901 | Deputy Commissioner | S.W. Gebo<br>Blairmore | - suggestions for remedying the present danger<br>- "forwarded simply for your information"<br>- see appendix 1.1 |
| May 12, 1901 | S.W. Gebo<br>Manager | Deputy Commissioner<br>Department of Public Works | - provides information on mining technique<br>- states that he is concerned with the safety of the men<br>- see appendix 1.1 |
| Sept. 28, 1901 | Frank Smith<br>Inspector of Mines | J.S. Dennis<br>Deputy Commissioner | - mine plan<br>- mining technique<br>- see appendix 1.1 |
| Nov. 4, 1901 | F.B. Smith<br>Inspector of Coal Mines | not specified | - noted possibility of "robbing the pillars too much on account of the great demand for coal" |

File #
77.237/48b

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Nov. 9, 1901 | Frank B. Smith Inspector of Coal Mines | J.S. Dennis Deputy Commissioner | - "they did not take any more from the pillars than was consistent with the safety of the mine and their workmen" |
| Nov. 27, 1902 | Frank B. Smith | J.S. Dennis | - fire reported to be found in the workings |
| Dec. 11, 1902 | Frank B. Smith Inspector of Coal Mines | B.J. Saunders Acting Deputy Commissioner | - fatal accident resulting from a cave-in |
| Apr. 4, 1903 | Frank B. Smith Inspector of Coal Mines | B.J. Saunders | - inspectors report<br>- found rooms 11, 10 & 9 in a very unsafe condition<br>- see appendix 1.1 |
| July 9, 1903 | Frank B. Smith Inspector of Coal Mines | B.J. Saunders | - discusses the progress of re-opening the mine<br>- see appendix 1.1 |
| Sept. 1, 1903 | Deputy Commissioner | Frank B. Smith Inspector of Coal Mines | - timbers found intact after the slide<br>- mine had "nothing to do with the disaster"<br>- management "very anxious not to be held responsible"<br>- see appendix 1.1 |
| Dec. 9, 1903 | Frank B. Smith Inspector of Coal Mines | B.J. Saunders Deputy Commissioner | - inspectors report<br>- see appendix 1.1 |
| Feb. 16, 1904 | Canadian-American Coal and Coke Co. Ltd. | The Coal Mines Regulations Ordinance | - Feb. 1, 1904, "the mine was declared in first class shape" |
| June 1, 1904 | J.A. McDonald | not specified | - request for thorough inspection<br>- "mine is in a dangerous condition"<br>- see appendix 1.1 |

File #
77.237/48b

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| June 11, 1903 | Frank B. Smith<br>Inspector of Coal Mines | John Stocks<br>Deputy Commissioner | - fatal accident due to cave-in |
| June 14, 1903 | Frank B. Smith<br>Inspector of Coal Mines | John Stocks<br>Deputy Commissioner | - discussion re: letter of June 1, 1904 from J.A. McDonald<br>- see appendix 1.1 |
| Dec. 13, 1904 | D.A. McDonald | Commissioner of Public Public Works | - "dangerous condition of Frank Mines"<br>- "timber is more needed than ever"<br>- see appendix 1.1 |
| Dec. 16, 1904 | Deputy Commissioner | Frank B. Smith | - re: letter dated Dec. 13, 1904<br>- see appendix 1.1 |
| Dec. 19, 1904 | S.W. Gebo<br>Canadian-American Coal and Coke Co. Ltd. | John Stocks<br>Dep. Com. Public Works | - re: letter dated Dec. 13, 1904<br>- see appendix 1.1 |
| Dec. 21, 1904 | Frank B. Smith<br>Inspector of Coal Mines | John Stocks<br>Dep. Com. Public Works | - re: letter dated Dec. 13, 1904<br>- see appendix 1.1 |
| Dec. 21, 1904 | J.A. McDonald | The Commissioner of of Public Works | - re: letter dated Dec. 13, 1904<br>- considers the Frank Mine the "safest mine I have worked in" |
| Dec. 24, 1904 | Frank B. Smith | John Stocks<br>Deputy Commissioner | - mine plan<br>- mining technique<br>- see appendix 1.1 |
| Mar. 3, 1905 | Frank B. Smith | John Stocks<br>Deputy Commissioner | - mine plan<br>- "method of working has not been satisfactory"<br>- "development ... pushed forward to make connections with the outside at Drumm Creek" |

File #
77.237/48b

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| June 26, 1905 | Frank B. Smith | J. Stocks<br>Deputy Commissioner | - opened a protion of the mine that was closed on account of fire<br>- the fire still existed and the workings were immediately closed up again |
| July 12, 1905 | Canadian-American Coal and Coke Co. Ltd. | J. Stocks<br>Commissioner of Public Works | - fatal accident resulting from a bursting of the partition between the coal chute and manway |
| Aug. 19, 1905 | Canadian-American Coal and Coke Co. Ltd. | J. Stocks<br>Commissioner of Public Works | - two men killed by a fall of coal |
| Aug. 26, 1905 | Frank B. Smith<br>Inspector of Coal Mines | J. Stocks<br>Commissioner of Public Works | - fire originated in the mine in April |
| Sept. 29, 1905 | The Canadian Metal Company | Commissioner of Public Works | - proceeding to work the North Tunnel of the Coal Mine |
| Jan. 13, 1906 | J.A. McDonald<br>Frank Miners Union | Johnson<br>Deputy Minister | - "Miners union wants inspector to enforce mining law, sections of mine dangerous" |
| Feb. 15, 1906 | Frank B. Smith<br>Inspector of Coal Mines | John Stocks<br>Deputy Minister | - inspection of workings which had been closed approximately one year on account of fire |
| Apr. 26, 1906 | Elijah Heathcote<br>District Inspector of Mines | John Stocks<br>Deputy Minister | - discussion of mining method |

File #
77.237/48b

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 30, 1907 | not specified | not specified | - report on the operations of the mine<br>- pillar removal<br>- Pit Committee report stating that sections are unsafe to travel due to bad roof and sides |
| 77.237/48e | | | |
| June 17, 1907 | Elijah Heathcote District Inspector of Mines | John Stocks Deputy Minister | - pillars of coal falling and crumbling away |
| July 31, 1907 | Pit Committee | not specified | - the report is difficult to read<br>- states "11½ shut is not saft"<br>- see appendix 1.2 |
| Undated | D.A. Stewart | Record of Measurements of Crevices on Turtle Mountain beginning June 2, 1903 | - see appendix 1.2 |
| May 13, 1908 | Provincial Inspector of Mines | Memo for Mr. Stocks | - rumor of Gebo's objective to boost production prior to the slide<br>- removal of pillars<br>- see appendix 1.2 |
| Aug. 19, 1908 | Elijah Heathcote District Inspector of Mines | John Stocks Deputy Minister of Public Works | - "entrance to the mine to the top of the old slope the gangway requires retimbering" |
| Oct. 30, 1908 | Elijah Heathcote District Inspector of Mines | John Stocks Deputy Minister of Public Works | - renewing of timbers "much requires to be done" |

File #
77.237/48e

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Feb. 22, 1909 | R. Livingstone<br>District Inspector of Mines | John Stocks<br>Deputy Minister | - mine plan.<br>- "prospecting for other seams of coal ... any great disturbing of the strata at this point may cause the other parts of the mountain to slide" |
| Mar. 15, 1909 | R.W. Brock | Hon. W.H. Cushing<br>Minister of Public Works | - question of whether coal mining operations between the shaft and the slide are safe<br>- see appendix 1.2 |
| Apr. 28, 1909 | John T. Stirling<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - mine plan<br>- pillar removal |
| July 29, 1909 | John T. Stirling<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - mine plan<br>- "the rock tunnel about 100 feet to the west of the entrance to No. 1 mine has been started again |
| 77.237/48g | | | |
| Feb. 25, 1909 | Norman Frazer<br>Provincial Inspector of Mines | John Stocks<br>Deputy Minister | - operations west of "present tunnel"<br>- workings in the vicinity of the mountain peak behind Frank<br>- require expert geological report<br>- see appendix 1.3 |
| Mar. 26, 1909 | Deputy Minister | R.W. Brock<br>Director of the Geological Survey | - request for examination of Turtle Mountain and the mining operations<br>- see appendix 1.3 |

File #
77.237/48g

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Apr. 5, 1909 | R. Livingstone District Inspector of Mines | John Stocks Deputy Minister of Public Works | - does not think present operations will have an effect on the mountain but would be advisable to have a geologist review the situation<br>- see appendix 1.3 |
| Apr. 8, 1909 | Deputy Minister | R.W. Brock Director of the Geological Survey | - responsibility of the safety of Turtle Mountain is that of the Dominion government<br>- see appendix 1.3 |
| Apr. 16, 1909 | R.W. Brock | John Stocks Deputy Minister of Public Works | - "unstable condition of the West shoulder of the mountain"<br>- see appendix 1.3 |
| Mar. 2, 1910 | Deputy Minister | R.W. Brock Director, Geological Survey of Canada | - not safe to tunnel under the lake or to extract coal so close to the base of the mountain |
| Mar. 26, 1910 | R.W. Brock | John Stocks Deputy Minister of Public Works | - unsafe to remove coal from either the shaft or the great seams<br>- see appendix 1.3 |
| Apr. 1, 1909 | R.W. Brock | John Stocks Deputy Minister of Public Works | - "It is dangerous to have any work done between the mouth of the old tunnel and the point indicated on the map" |

File #
77.237/48g

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 12, 1910 | R.W. Brock | John Stocks<br>Deputy Minister of Public Works | - "questionable if coal should be mined below the entry level anywhere under the former slide, as it would be practically certain to bring down a large slice of south peak"<br>- see appendix 1.3 |
| May 30, 1910 | John T. Stirling<br>Provincial Inspector of Mines | Mr. Stocks | - "as the Company are now mining (within the danger area) some action should be taken...without delay"<br>- see appendix 1.3 |
| June 27, 1910 | Elijah Heathcote<br>Dist. Inspector of Mines | A.A. Muller<br>General Manager<br>Canadian Coal Consolidated Co. Ltd. | - "the present system of working will endanger the whole of the mine"<br>- pillar removal<br>- cave-ins<br>- refers to shaft mine<br>- see appendix 1.3 |
| June 28, 1910 | Elijah Heathcote<br>Dist. Inspector of Mines | John Stocks<br>Deputy Minister | - pillar removal<br>- cave-ins<br>- "extraction of two thirds of the coal ... is a safe method for today only"<br>- "in the near future a movement of the walls ... would cause the whole of the mine to collapse"<br>- refers to shaft mine |

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LOCATION
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| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| June 30, 1910 | John T. Stirling Provincial Inspector of Mines | Memo for Mr. Stocks | - cave-ins<br>- pillar removal<br>- "when timbers decay there is nothing whatever left to support the walls"<br>- "this system should be condemned for being unsafe"<br>- refers to shaft mine<br>- see appendix 1.3 |
| July 21, 1910 | R.W. Brock | John Stocks Deputy Minister of | - "the Geological Survey ... are firmly convinced that there is danger" |
| July 21, 1910 | John T. Stirling | John Stocks | - Mines closed down at Frank<br>- see appendix 1.3 |
| July 25, 1910 | Elijah Heathcote Dist. Inspector of Mines | John Stocks Deputy Minister | - description of mine in relation to the danger zone |
| July 27, 1910 | not specified | Statements re workings in Shaft Mine at Frank and action taken | - summary |
| undated | not specified | Notes Re Frank Mine | - refers to shaft mine<br>- see appendix 1.3 |
| undated | not specified | Turtle Mountain Summary Report 1909 | - description of the summit of Turtle Mountain<br>- see appendix 1.3 |
| Oct. 1, 1910 | Elijah Heathcote District Inspector of Mines | John Stocks Deputy Minister of Public Works | - "all drivings in the slope ... are in the danger zone" |
| July 12, 1911 | Provincial Inspector of Mines | R.W. Brook | - discussion of newspaper clipping on the slide issue<br>- see appendix 1.3 |

File #
77.237/48g

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| July 21, 1911 | R.W. Brock | A.A. Muller<br>General Managers<br>The Canadian Coal Consolidated Co. Ltd. | - "the central peak was undermined and the block that was undermined came down. If the northwest peak and shoulder is similarily undermined, there must exist the danger that it too will come down" |
| Aug. 11, 1911 | Provincial Inspector of Mines | R.W. Brock | - "the Company have been mining in ... the zone of extreme danger" |

77.237/48f

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Nov. 20, 1909 | John T. Stirling (Dist. Inspector of Mines) | John Stocks (Deputy Minister) | - mine plan<br>- pillar removal |
| Mar. 21, 1910 | The Canadian Coal Consolidated Company | blue print | - mine plan (shaft mine) |
| Jan. 28, 1910 | John T. Stirling (Dist. Inspector of Mines) | John Stocks | - mine plan (shaft mine)<br>- coal seam description |
| Mar. 7, 1910 | John T. Stirling Dist. Inspector of Mines | John Stocks | - mine plan<br>- pillar robbing<br>- geology |
| Apr. 2, 1910 | Elijah Healthcote Dist. Inspector of Mines | John Stocks | - slide issue |

File #
77.237/48f

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Nov. 3, 1910 | R.W. Brock | John Stocks<br>Deputy Minsiter, Department of Public Works | - slide issue<br>- Geological Survey of Canada<br>- geology<br>- see appendix 1.4 |
| Nov. 12, 1910 | Joseph Emmerson | Elijah Heathcote | - fires |
| Nov. 14, 1910 | Elijah Heathcote | John Stocks<br>Deputy Minister | - slide issue<br>- geology<br>- no more mining should be done<br>- see appendix 1.4 |
| Nov. 21, 1910 | Jts | Elijah Heathcote | - fires |
| Nov. 21, 1910 | Elijah Heathcote<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - fires<br>- see appendix 1.4 |
| Nov. 21, 1910 | Elijah Heathcote<br>District Inspector of Mines | A.A. Muller<br>General Manager, Canadian Coal Consolidated Ltd. | - cave-in<br>- bad timbers |
| Nov. 25, 1910 | A.A. Muller<br>Canadian Coal Consolidated Ltd. | Mr. E. Heathcote<br>Inspector of Mines | - geology<br>- pillar removal |
| Dec. 10, 1910 | Heathcote | John T. Stirling<br>Provincial Inspector of Mines | - heavy squeeze<br>- pillar removal<br>- dangerous for men to travel |
| Dec. 31, 1910 | Elijah Heathcote<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - "squeeze"<br>- bad timbers<br>- cave-ins<br>- geology<br>- see appendix 1.4 |

File #
77.237/48a

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Feb. 3, 1911 | John T. Stirling<br>Provincial Inspector of Mines | Mr. Stocks | - slide issue<br>- "company still mining...in the danger zone" |
| Apr. 10, 1911 | Elijah Heathcote<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - cave-in<br>- "a heavy cave has occurred in the old old main level" |
| Aug. 19, 1911 | Provincial Inspector of Mines | Memo to File | - slide issue<br>- appointment of the commission |
| Aug. 22, 1911 | R.W. Brock<br>Director, Geological Survey | John Stocks<br>Deputy Minister of Public Works | - slide issue<br>- see appendix 1.5 |
| Aug. 25, 1911 | Elijah Heathcote<br>District Inspector of Mines | A.A. Muller<br>General Manager, Canadian Consolidated Coal Co. Ltd. | - cave-ins |
| Aug. 25, 1911 | Elijah Heathcote<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - cave-ins |
| Sept. 30, 1911 | Francis Aspinall<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - pillar removal<br>- fire in angle 71 |
| Oct. 14, 1911 | Francis Aspinall<br>District Inspector of Mines | John Stocks<br>Deputy Minister of Public Works | - mine plan<br>- retimbering of main entry and removing caves |
| Dec. 26, 1911 | Francis Aspinall<br>District Inspector of Mines | John T. Stirling<br>Provincial Inspector of mines | - cave-in |
| Feb. 24, 1912 | Francis Aspinall<br>District Inspector of Mines | John T. Stirling<br>Provincial Inspector of mines | - cave-in |

File #
77.237/48a

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Apr. 1, 1912 | Francis Aspinall<br>District Inspector of Mines | John T. Stirling<br>Provincial Inspector of Mines | - timbers do not appear to be under abnormal stress<br>- no sign of damage<br>- see appendix 1.5 |
| May 20, 1912 | W.J. Bubb & Co. Ltd. | Department of Mines | - surface cave-ins<br>- see appendix |
| July 23, 1912 | Francis Aspinall<br>District Inspector of Mines | J.T. Stirling<br>Provincial Inspector of Mines | - mine plan<br>- pillar removal |
| 77.237/48c | | | |
| Mar. 4, 1913 | Francis Aspinall<br>District Inspector of Mines | John T. Stirling<br>Provincial Inspector of Mines | - pillar removal |
| Jan. 26, 1914 | Andrew Scott<br>District Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-ins |
| Apr. 13, 1914 | Andrew Scott<br>District Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-ins<br>- mine plan |
| Apr. 29, 1914 | General Superintendent | D.C. Coleman<br>General Superintendent | - cave-ins |
| July 14, 1914 | Chief Inspector of Mines | D.C. Coleman<br>General Superintendent<br>C.P. Ry. Co. | - cave-ins |
| Sept. 21, 1914 | Chief Inspector of Mines | R.W. Brock<br>Deputy Minister of Mines | - slide issue<br>- driving 2 slopes through the danger zone |
| Oct. 1, 1914 | R.W. Brock | John T. Stirling<br>Chief Inspector of Mines | - slide issue<br>- "wish the company would leave the coal seam alone"<br>- see appendix 1.6 |

File #
77.237/48c

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Dec. 14, 1914 | Francis Aspinall<br>Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - mine plan |
| Jan. 19, 1915 | Wm. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-in |
| 77.237/48d | | | |
| Feb. 10, 1916 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - pillar removal |
| Mar. 13, 1916 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-ins |
| May 20, 1916 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - bad timbers due to roof pressure |
| July 22, 1916 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - poor timbers |
| July 25, 1916 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-in (bulkhead dropped out) |
| Aug. 2, 1917 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-in |
| Aug. 4, 1917 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - poor timbers |
| Sept. 8, 1917 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - poor timbers (due to pressure) |

File #
77.237/48d

LOCATION
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Oct. 5, 1917 | J.G. Prentice<br>Pit Boss | The Minister of Public Works | - accident; man hit by piece of falling coal |
| Nov. 21, 1917 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - poor timbers (side pressure) |
| Aug. 20, 1963 | L.M. Kutcher<br>Secretary-Treasurer<br>Village of Frank | J.A. Dutton<br>Director<br>Mines Division | - surface cave-in |
| 77.237/48h | | | |
| Oct. 18, 1916 | W. Shaw<br>Dist. Inspector of Mines | (not specified) | - pillar removal<br>"men are working at repairing the timbering continuously" |
| ___ 28, 1916 | WOODS, SHERRY, COLLISSON & FIELD<br>Barristers, Soliciters Notaries | John Stirling<br>Chief Inspector of Mines | - surface cave-in at zinc smelter property |
| Nov. 4, 1916 | W. Shaw<br>Dist. Inspector of Mines | John Stirling<br>Chief Inspector of Mines | - surface cave-in at zinc smelter property<br>- pillar removal<br>- poor timbers |
| Jan. 20, 1917 | W. Shaw<br>Dist. Inspector of Mines | John Stirling<br>Chief Inspector of Mines | - poor timbers<br>- pillar removal |
| Mar. 5, 1917 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - poor timbers<br>- squeeze |
| Mar. 21, 1917 | W. Shaw<br>Dist. Inspector of Mines | John T. Stirling<br>Chief Inspector of Mines | - cave-ins<br>- poor timbers<br>- "squeeze"<br>- pillar removal<br>- see appendix 1.7 |

File #
77.237/48h

LOCATION:
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| July 24, 1917 | W. Shaw Dist. Inspector of Mines | John T. Stirling Chief Inspector of Mines | - surface cave-in at smelter works |
| Feb. 22, 1918 | W. Stevenson Dist. Inspector of Mines | John T. Stirling Chief Inspector of Mines | - surface cave-in (movement taken place) |
| Apr. 1, 1918 | W. Stevenson Dist. Inspector of Mines | John T. Stirling Chief Inspector of Mines | - surface cave-in (same area, another site) |
| Aor. 6, 1918 | W. Stevenson Dist. Inspector of Mines | John Brown, Manager Franco-Canadian Collieries Ltd. | - fire<br>- explosion<br>(end of mining operations on Apr. 3, 1918) |
| Apr. 9, 1918 | W. Stevenson<br>W. Shaw and<br>D. McDonald<br>District Inspectors of Mines | John T. Stirling Chief Inspector of Mines | - fire<br>- cave-in<br>- see appendix 1.7 |
| Apr. 11, 1918 | John Brown et al Franco-Canadian Collieries Ltd | not specified | - fire<br>- cave in<br>- see appendix 1.7 |
| Apr. 18, 1918 | W. Stevenson Dist. Inspector of Mines | John T. Stirling Chief Inspector of Mines | - cave-ins |
| June 22, 1918 | John Brown, Manager Franco-Canadian Collieries Ltd | John T. Stirling Chief Inspector of Mines | - fire |
| July 11, 1918 | John Brown, Manager Franco-Canadian Collieries Ltd | Minister of Public Works | - shaft mine closed June 30, 1918 |
| July 22, 1918 | W. Shaw District Inspector of Mines | John T. Stirling Chief Inspector of Mines | - explosion July 16 at the old entry |

File #
77.237/481

LOCATION:
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Sept. 27, 1918 | Chief Inspector of Mines | James Crowder Dist. Inspector of Mines | - surface cave-in |
| Sept. 26, 1918 | James Crowder Dist. Inspector of Mines | John T. Stirling Chief Inspector of Mines | - surface cave-in |
| Aug. 29, 1966 | I.N. Potter Dist. Inspector of Mines | J.D.B. Brown Director of Mines | - surface cave-in |
| 67.303 Box 94 | (Removal of the Town of Frank from the Base of Turtle Mountain) | | |
| June 28, 1935 | J.A. Allan Professor of Geology | Hon. J.J. McLellan Minister of Public Works | - Geodetic Survey<br>- see appendix 1.8 |
| Aug. 20, 1934 | J.A. Allan Professor of Geology | Hon. J.J. McLellan Minister of Public Works | - gauge stations<br>- cracks enlarged<br>- see appendix 1.8 |
| Sept. 6, 1933 | not specified | Hon. T.G. Murphy Minister of the Interior | - slide issue<br>- tremor of considerable magnitude felt in Hillcrest<br>- evidence that there is movement in south peak<br>- see appendix 1.8 |
| 67.303 Box 94 | | | |
| Feb. 13, 1933 | J.D. Robertson Deputy Minister Dept. of Public Works | Residents within the Turtle Mountain Danger Zone | - slide issue<br>- notice of danger |
| Jan. 12, 1932 | A.A. Millar Chief Inspector of Mines | Memo to Premier Brownlee | - slide issue<br>- pillar removal<br>- see appendix 1.8 |

File #
66,149

LOCATION:
Provincial Archives of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1905 | Dept. of Public Works | Annual Report<br>(pg. 18) | - fire<br>- see appendix 1.8 |
| 72,214 | | | |
| 1902 | Dept. of Public Works | Annual Report<br>(pg. 17) | - cave in<br>- resulted in a fatal accident |

File #
CB.S849

LOCATION:
Glenbow Archives

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 3, 1903 | Stewart, Herbert D.R. | Father | - letter about slide<br>- rocks smelt of gas |
| CB. P359 | | | |
| Dec. 16, 1915 | Wm. Pearce | R.W. Macintyre | - slide issue (letter about the slide re:cause) (reference to mining practices)<br>- see appendix 2 |
| M327 | | | |
| Jan., 1942 | H.E. Vokes Assistant Curator of Invertebrate Paleontology, American Museum of Natural History | Landslide Natural History, January, 1942 | - slide issue<br>- discussion of what happened in the mine and atmosphere prior to the slide<br>- cave-ins<br>- geology<br>- crushing timbers<br>- mine stability<br>- rumblings prior to incident |
| M676 | | | |
| Apr. 28, 1953 | Robert H. Chestnut Survivor of the Frank Slide | The Lethbridge Herald (pg. 4) | - in afternoon of Apr. 28, 1903 small pieces of rock came "pinging from someplace above" |
| Apr. 28, 1953 | not specified | The Lethbridge Herald (pg. 18) | - for 4 months previous to slide, walls were squeezing in and timbers 2' thick buckled the day after being set |

File #
M676

LOCATION:
Glenbow Archives

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Apr. 26, 1962 | T.J. Cooper<br>Survivor of the Frank Slide | The Pincher Creek Echo (pg. 6) | - description of slide on Apr. 29, 1903 (sounds) |
| Aug., 1959 | Frank Rasky | Alberta's awful avalanche "Liberty" magazine (pg. 18) | - slide issue |

D364.971.S814

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| June 2, 1960 | Ian Steele | Interview with R.B. Leard N.W.M.P. Frank detachment 1902-1903 | - pillar removal<br>- top of mountain cracked before the slide; looked at it himself |
| Nov. 18, 1957 | Ian Steele | Interview with Neil Nicholsom N.W.M.P., titled "The Frank Slide" | - slide issue<br>- "face of Turtle mountain changed alot" |

File #
9/2/6/2-20:2

LOCATION:
University of Alberta Archives

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 4, 1903 | Wm. Pearce | James A. Smart<br>Deputy Minister of Interior | - slide issue<br>- letter including telegrams and desciption of Frank after the slide |
| May 5, 1903 | Wm. Pearce | James A. Smart<br>Deputy Minister of Interior | - private letter indicating belief that mining was at fault for the slide |
| not specified<br>approx. May, 1903 | not specified | Diagrams | - geological discussion of Turtle Mountain |
| May 14, 1903 | not specified<br>assumed Wm. Pearce | Charles Whiting Baker<br>Engineering News | - infers mining is the cause of the slide and due to his position with the government the author is barred from stating the same |
| May 16, 1903 | Wm. Pearce | The Great Rockslide at Frank, Engineering News, Vol. 49, No. 23 pp. 490-492 | - article on Frank Slide<br>- cave-in at mouth<br>- timbers buckled or crushed<br>- geology |
| May 18, 1903 | Wm. Pearce | Engineering News | - slide issue<br>- discussion of McConnell and Brock's findings |
| June 29, 1903 | E.J. Taylor<br>Civil and Mining Engineer | Wm. Pearce | - slide issue<br>- discussion of article published in Engineering News,<br>- Taylor visited the mine in 1901<br>- cause of the slide considered to be the mine |

File #
9/2/6/2-20:2

LOCATION:
University of Alberta Archives

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Aug. 7, 1903 | Wm. Pearce | Hon. F.W.G. Haultain<br>Premier N.W.T. | - slide issue<br>- refers to Mr. Gebo's, (Manager of the Frank Mine), statements that the mine was not at fault ie) no change to the interior of the mine (walls have not been crushed in to the slightest extent) |
| Aug. 12, 1903 | Wm. Pearce | E.J. Taylor | - see appendix 3<br>- information as per above letter |
| Feb. 27, 1904 | Wm. Pearce | Howard W. Dubois | - possibility that the mine was not at fault |

NO FILE # (in reference section)

| | | | |
|---|---|---|---|
| 1910 | Director Geological Survey Branch | Turtle Mountain, Frank, Alta (pg. 15) Summary Report of the Geological Survey Branch of the Dept. of Mines 1910 [No. 1170] | - slide issue<br>- new cracks appeared on North Peak indicating its instability |

NO FILE # (in reference section)

| | | | |
|---|---|---|---|
| 1911 | Director Geological Survey Branch | Turtle Mountain Commission (pg. 12) Summary Report of the Geological Survey Branch of the Dept. of Mines, 1911 [No. 1218] | - slide issue |

File #
77.62:3

LOCATION:
University of Alberta Archives

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| Aug. 13, 1933 | J.A. Allan<br>Professor of Geology | Hon. O.J. McPherson<br>Minister of Public Works | - slide issue<br>- tremors reported in Hillcrest area, one of considerable magnitude early summer of 1933 |

File #
MC82.8C21d 205 C1

LOCATION:
Geological Survey of Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| March 31, 1971 | D.K. Norris | Comparative Study of the Castle River and other folds in the Eastern Cordillera of Canada, Geological Survey of Canada Bulletin 205. | - refers to Turtle Mountain fault |
| MC82.8C21r | | | |
| 1962 | R.A. Price | Fernie Map-Area, East Half, Alberta and British Columbia 82GE½, Geological Survey of Canada Paper 61-24, pg 46. | - discussion of Turtle Mountain fault sheet |
| MC82.8C21.C3 | | | |
| 1900 | The Director | Summary Report of the Geological Survey for the year 1900, pg 15A | - brief discussion of coal seams and expected problems of "pressure upon the workings as these progress" |
| MC82.8C21 Vol. 1 | | | |
| 1885 | G.M. Dawson | Geological Survey of Canada Annual Report, Vol I pt B, pg 65 | - provides a description of the geology of the Crowsnest Pass |

File #
MC82.8C21 Vol.15

LOCATION:
Geological Survey of Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1902 | W.W. Leach | The Blairmore-Frank Coal Fields, Geological Survey of Canada Annual Report Vol. XV, pg 178A. | - discusses the geology of Turtle Mountain and refers to the Canadian-American Coal and Coke Company<br>- contains a pre-slide topographical map<br>- see appendix 4 |
| MC82.8C21s 1911 | | | |
| 1911 | W.W. Leach | Geology of the Blairmore Map Area, Alberta, Geological Survey of Canada Summary Report 1911 | - discusses the geology of the study area but does not concentrate on Turtle Mountain |
| MC82.8C21s 1915 | | | |
| 1915 | F.H. McLearn | Jurassic and Cretaceous, Crowsnest Pass, Alberta, Geological Survey of Canada Summary Report 1915, pg 110. | - discusses the geology of the area and makes reference to Turtle Mountain |
| MC82.8C21s 1916 | | | |
| 1916 | B. Rose | Crowsnest Coal Field, Alberta, Geological Survey of Canada Summary Report 1916, pg 107 | - general geological description of the study area |
| MC82.8C21s 1931 | | | |
| 1931 | B.R. MacKay | Geological Survey of Canada Summary Report 1931, pg B, pg 1 | - discusses the fact that rocks of Devonian age were observed to outcrop on the landslide scarp of Turtle Mountain<br>- briefly discuss the sturcture of the mountain (pg 8 to 9) |

File #
MC82.8C21 memoir 53

LOCATION:
Geological Survey of Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1914 | D.B. Dowling | Coal Fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia, Geological Survey of Canada Memoir 53 | - contains very general information on the Frank Mine |
| MC82.8C21 memoir 59 | | | |
| 1915 | D.B. Dowling | Coal Fields and Coal Resources of Canada, Geological Survey of Canada memoir 59 | - contains a very brief description of Blairmore-Frank area (pg 86)<br>- contains a geological sketch map of the Blairmore-Frank Coal-Fields (Map 130A) |
| MC82.8C21 paper 55-18 | | | |
| 1955 | D.K. Norris | Blairmore, Alberta, Geological Survey of Canada, paper 55-18 | - description and map of the geology of the Blairmore Map area including Turtle Mountain<br>- contains two cross-sections, one through Turtle Mountain<br>- describes the Turtle Mountain Fault |
| RD.7C21 Vol. 21 | | | |
| 1902 | not specified | Canadian Mining Journal Vol 21, pg 181. | - describes the progress of the Canadian-American Coal and Coke company in terms of good quality coal and the number of men employed |

File #
RD.7C21 Vol. 22

LOCATION:
Geological Survey of Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1903 | Frank B. Smith<br>Inspector of Mines | The Frank Disaster, Canadian Mining Journal Vol 22. | - description of the Frank Slide<br>- describes the mine as having no damage except several crushed pillars, serging of the hanging wall and a crushing and falling of coal<br>- attributes the cause of the slide to mining and/or a freeze thaw action<br>- see appendix 4 |
| 1903 | Raoul Green | Utitled, Canadian Mining Journal Vol 22 | - describes the slide and refers to possible causes such as the mine<br>- see appendix 4 |
| RD7C21 Vol. 32 | | | |
| 1904 | not specified | Canadian Mining Journal Vol. 23 | - states that the Canadian-American Coal and Coke Company hopes to regain a reputation as a "big producer" |
| RD7C21 Vol. 29 | | | |
| 1908 | not specified | Canadian Mining Journal Vol. 29, pg 221 | - states that the Frank Mine was inspected April 29, 1908 and was found to be in good condition |

File #
RD.7E57 Vol. 76

LOCATION:
Geological Survey of Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1903 | W.E. Dowlen Consulting Engineer to the Canadian-American Coal and Coke Company Ltd. | The Turtle Montain Rock Slide, Engineering and Mining Journal, Vol. 76, pg 10. | - describes the geology of Turtle Mountain showing cross-sectional sketches<br>- states that the "mining operations at Frank bear no relation whatever to the rock slide"<br>- the mine was "in splendid condition" after the slide<br>- see appendix 4 |
| RD.8C21 Vol. 35 | | | |
| 1932 | B.R. MacKay | Portraying geological structure of Canadian coal-fields, Canadian Institute of Mining and Metallurgy, Transactions Vol. 35, pg 104. | - gives a detailed description of the geology of Turtle Mountain through the use of a Structure Section Model |

File #
RG 15 Vol 895 file #779886

LOCATION:
Public Archives Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 5, 1903 | Wm. Pearce<br>Chief Inspector of Surveys | James A. Smart<br>Deputy Minister of Interior | - visit to slide and summit<br>- any further slides will not be serious<br>- see appendix 5 |
| May 1, 1903 | Mr. W.W. Leach<br>Geological Survey of Canada | Director<br>Geological Survey of Canada | - geology of Turtle Mountain<br>- see appendix 5 |
| May 1, 1903 | Wm. Pearce | James A. Smart | - Chief Engineer McHenry fears further rock slides<br>- see appendix 5 |
| August 7, 1903 | Wm. Pearce | James A. Smart<br>Deputy Minister of the Interior | - "disaster was caused by the mining operations"<br>- fear of additional slides<br>- see appendix 5 |
| approx. Nov., 1913 |  | Map | - map showing "area of danger if the North Peak should fall"<br>- see appendix 5 |
| Dec. 6, 1912 | Department of Mines<br>Geological Survey | Reference Sheet | - reference sheet showing D.L.S. posts<br>- see appendix 5 |
| R.G. 45 Vol 45 file #2306 |  |  |  |
| July 20, 1911 | R.W. Brock | Mr. Harvey Murphy<br>Frank, Alberta | - unsafe to mine below the northwest shoulder and peak<br>- see appendix 5 |
| July 22, 1911 | R.W. Brock | H. Balfour<br>General Manager<br>Union Bank of Canada | - mining should be stopped<br>- see appendix 5 |

FILE #
RG 45 Vol 45 file #2036

LOCATION:
Public Archives Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 12, 1910 (possible error in year, perhaps 1911) | R.W. Brock | Canadian Coal Consolidated Co. Ltd., | - danger of mining under North Peak<br>- mining was a prime cause for the slide<br>- see appendix 5 |
| Nov. 6, 1911 | J.E. Woods | W.G. Miller<br>Bureau of Mines | - description of the summit of Turtle Mountain after the slide<br>- description of the mine prior to the slide 2 cross-sections of Turtle Mountain |
| Mar. 4, 1912 | G.S. Rice<br>Member of the Commission | W.G. Miller<br>Convener of Commission | - commented that J.E. Woods knowledge is hearsay not based on facts<br>- see appendix 5 |
| Oct. 3, 1930 | J.O. Apps<br>General Executive Assistant<br>C.P.Ry.Co. | L.L. Bolton<br>Assistant Deputy Minister of Mines | - cracks have appeared and have widened on the summit<br>- see appendix 5 |
| Oct. 10, 1930 | L.L. Bolton<br>Acting Deputy Minister | J.O. Apps | - dangerous movement might be indicated by a closing of the cracks<br>- see appendix 5 |
| July 25, 1931 | B.R. Mackay | Preliminary Report on Stability Conditions in Turtle Mountain Crowsnest Pass District, Alberta. | - report contained also in file #67.303 (box 94) Alberta Provincial Archives<br>- cross-sections and map copied<br>- see appendix 5 |
| July 31, 1931 | Acting Deputy Minister | W.A. Gordon<br>Minister of Mines | - discussion of studies completed re: Turtle Mountain and the findings of B.R. Mackay<br>- see appendix 5 |

FILE #
RG 45 Vol 223 Book 2619

LOCATION:
Public Archives Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1903 | R.G. McConnell | Field Note Book Geological Survey of Canada | - note book on Turtle Mountain - sketch after the slide and rough sketch of the "contour of the coal strike", fault and main tunnel pg 15.<br>- very little written material<br>- see appendix 5 |

RG 18 Vol 1527 File 135-139

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| May 7, 1903 | unspecified | Colonel White | - "Frank is in danger of a second slide"<br>- see appendix 5 |
| May 18, ___ | Haultain | Perry | - "fissure on west peak has widened from six to eight inches in past six days"<br>- see appendix 5 |
| May 20, 1903 | Davidson, Inspector | The Officer Commanding, MacLeod | - copy of telegram stating that C.P.R. officials report that the West peak is dangerous<br>- see appendix 5 |
| May 23, 1903 | Davidson, Inspector | The Officer Commanding, MacLeod | - copy of a notice from the coal company stating that there is no immediate danger to the town<br>- see appendix 5 |

RG 45 Vol 218 File 1763

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| 1902 | W.W. Leach | Survey Note Book | - pre-slide survey notes pertaining to Turtle Mountain<br>- see appendix 5 |

FILE #
MG 26 GC 800 72637

LOCATION:
Public Archives Canada

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| April 11, 1903 | D. McNicoll<br>Canadian Pacific Railway | Sir Wilfred Laurier (telegram) | - "Taulor reports no reason why more of the mountain west towards Blairmore should not come down" |
| MG 26 G C800 72639 | | | |
| Undated (assumed to be May, 1903) | McNicoll | Jas. A. Smart | - description of the slide and plans to re-route CPR passengers |
| MG 26 G C 800 73519 | | | |
| May 20, 1903 | Fred White<br>Comptroller of N.W.M.P. | Laurier (copy of telegram sent by Commissioner Perry) | - "opinion of the geological department there is further danger to the town of Frank. Premier has asked Police to warn people of the danger but suggests no further action" |

FILE #
NO FILE #

LOCATION:
Department of Civil Engineering University of Alberta

| Date | From/Author | To/Title | Key Words |
|---|---|---|---|
| undated | D.R. Bourne,<br>D.R. Piteau, and<br>D.M. Cruden | Rock and Soil Landslide Tour, VII Pan American Conference on Soil Mechanics and Foundation Engineering, pp 36-47 | - description of the slide and slide debris<br>- includes a cross-section through Turtle Mountain, figure 14 |

## 3. INVENTORY OF REPORTS

Since the Frank Slide in 1903, many reports have been written investigating the cause of the slide and the stability of Turtle Mountain. The following section provides the location and file numbers of the reports and a brief description of their contents. Summaries and conclusions have been quoted where applicable.

FILE #
67.303 (box 94)

LOCATION
Provincial Archives of Alberta

Date: June 12, 1903
Author: R.G. McConnell
R.W. Brock
Geological Survey of Canada
Department of The Interior Dominion of Canada
Title: The Great Landslide at Frank, Alberta

The report written by R.G. McConnell and R.W. Brock of the Geological Survey of Canada describes the geology of Turtle Mountain and various aspects of the slide under the subsections Description of the Slide, Classification, Time and Rate of Movement, Character of Movement, The Slide Rock, Surface of the Slide, Changes in Topography, Some Minor Features, Dimensions, Causes of the Landslip, Statements Regarding the Condition of the Mine Before the Slide, Present Condition, Present Dangers and Summary. A series of 13 plates contains photographs of Turtle Mountain both pre and post slide. In the report, McConnell and Brock attributed the naturally unstable condition of Turtle Mountain as the major cause of the slide. Possible contributing factors include the earthquake of 1901 and the coal mine at the base of the mountain. The authors stated that "It is a significant fact that the edges of the break correspond very closely with the limits of the big chambers and mined coal." pg. 13.

Slight movements or shocks occuring between 1:00 and 3:00 a.m. were noticed seven months prior to the slide. In addition, a general squeeze was noticed in the mine and at times the coal would "mine itself". pg. 13.

The authors also discussed the meteorological conditions prior to the slide. Temperatures which dropped significantly on the eve of the slide may have been contributary to its occurence.

The authors summarized the report as follows:

## Summary

"As to the nature of the disaster at Frank there cannot be any doubt. It was a rock slide (Bergsturz) of colossal dimensions, one of the largest on record.

Turtle mountain, part of which fell away, is a sharp Rocky Mountain ridge, which with the exception of a short talus slope at the base, rises very steeply in a succession of cliffs to a height of 3,100 feet above the valley. It is the central and highest peak of the ridge which broke away. The mountain consists of Cretaceous sandstone or shales at the base, with limestone (part at least of Devonian age) forming all the upper portions. The limestone has been thrust over the newer rocks along a fault plane by the mountain building forces. The Createceous beds were overturned, dipping into the mountain at an angle of 82°, while the limestones have a westerly dip of 50°. The basal beds of the limestones have been much folded and crumpled by friction, due to thrusting forward of the series along the fault plane. They form a very weak base for the precipitous mass above. The mountain is thoroughly dissected by fractures and jointing planes.

On the morning of April 29, a mass of rock surrounding the central peak, half a mile square and four of five hundred feet thick in the centre suddenly broke away and rushed with great velocity into and across the valley, destroying everything in its path. Fortunately the greater part of the town lay outside the course of the slide, but much property was destroyed and seventy lives were lost. Over a square mile of pleasant valley was transformed into a dismal waste of rock.

The motion of the slide rock was complex in detail, but as a whole resembled that of a viscous fluid. The distance from the top of the break to the foot of the slide, following the slope, is about two and a half miles. The average thickness of the slide rock across the valley, along the centre of the slide, is 65 feet, the deepest portion of the slide about 150 feet thick, and the average over the whole slide cannot be less than 45 feet. A rough estimate of the amount of material dislodged is about 40,000,000 cubic yards, representing in weight about 90,000,000 tons.

In the Alps destructive land slides have been quite frequent, but are exceedingly uncommon in the Canadian Rockies. None at all approaching this one in size has ever been recorded.

The slide was due not to a single cause, but to a combination of causes. The primary cause was undoubtedly the form and structure of Turtle Mountain, already referred to. The huge mass was in a state of unstable equilibrium, possessed a weak base, and was thoroughly traversed by fissure and jointing planes, in which water and frost were continuously at work removing one by one the supports which held it in place. The heavy precipitation of the last few years accelerated this process. Recent earthquake tremors, particularly that of 1901, no doubt hastened the time of final disruption. The opening up of large chambers in the mine, situated under the base of the mountain, may have been a contributory cause, by allowing slight readjustments in the strata forming the hanging wall of the seam, producing jars that might dissever some of the few remaining bonds. The heavy frost on the morning of the slide, which followed hot summer-like days, appears to have been the force which served the last thread and precipitated the unbalanced mass.

The zone surrounding the cavity left by the mass which broke away is excessively fractured and is doomed to fall. That portion behind the break and south of it is not dangerous as it has a free course and is already falling in small individual blocks. The north peak and shoulder overhauging the town are, however, dangerous. They threaten the town and the mouth of the mine. Their condition now is very similar to that of the central peak before it fell away. There is always some possibility of a sudden movement, although the commencement of the movement is more likely to be gradual. In course of time, ordinary atmospheric weathering will bring down this threatening mass, but a slight earthquake shock, a succession of seasons with unusually heavy precipitation and rapid temperature changes, or the closing of the chambers in the mine, after the coal has been drawn, perhaps long after the inhabitants of the town have lost all dread of another disaster, may precipitate it suddenly in a second destructive slide.

Since this possibility must always overhang the town, it certainly seems advisable that it be moved a short distance up the valley, beyond the reach of danger."

FILE #
67.303 (box 94)

LOCATION
Provincial Archives of Alberta

Date: 1912
Author: R.A. Daly
W.G. Miller
G.S. Rice
Department of Mines
Geological Survey Branch
Title: Report of the Commission appointed to investigate Turtle Mountain, Frank, Alberta. 1911

The report written by the Commission; R.A. Daly, W.G. Miller and G.S. Rice discusses the probability of a great slide due to existing natural conditions in section A, and the influence of mining on the stability of Turtle Mountain in section B.

Details of the geology including nine cross-sections of the mountain are presented in section A. The authors also discussed stability changes in the structure of Turtle Mountain resulting from the 1903 slide. They believe that evidence of 'new' cracks on the North Peak indicate decreased stability of the mountain.

The relation of operations in the drift mine (old mine) to the landslide of 1903 is discussed in section B. "Witnesses ... stated that a squeeze of the walls of the seam was apparent prior to the landslide" (pg. 24). "Commission agrees ... that the movement of the walls was instrumental in weakening the supports of the peak and possibly was directly responsible for the landslide." (pg. 25).

Section C, conclusions, is quoted below.

## C. Conclusions

### DANGER FROM MINING

> "Your Commission, therefore, concludes that under present commercial conditions it is not possible to mine within a certain area without incurring the danger of precipitating a great landslide. We place the north limit of this area at the present

south limit of the shaft-mine workings, and the south limit of the area at a point five thousand feet south of the mouth of the No. 1 mine. The latter limit has been placed so far south on account of the possibility that mining operations should cause a landslide from the South peak, which in turn might cause one from the North peak, thus endangering the town, and the tracks and equipment of the Canadian Pacific railway.

The only conditions under which mining should be carried on in the danger area above described are: (1) The townsite should be abandoned and the risk to the property of the Canadian Pacific railway assumed. (2) The present entrance to No. 1 (drift) mine should be abandoned and the mine should be operated by deep levels from the shaft mine or from an opening at the extreme southern end of the property in the vicinity of Hillcrest. (3) Unusually heavy pillars should be left throughout the danger area, particularly in the upper levels, and not more than 50 per cent of the coal should be extracted. (4) The excavated areas should be packed.

## DANGEROUS NATURAL CAUSES

Taking into account: (a) the steepness of the eastern slope of Turtle mountain, (b) its peculiar structure, and especially the attitude of the joint planes (planes of scission), (c) the possibility of internal stresses, inherited from the period of original upheaval, (d) the effect of highly possible jars on the delicate mechanism of this particular mountain (jars of a moderate earthquake, like that of 1901 in this region, or slight settlement of the mine workings might precipitate a slide of the first order), (e) the strong similarity of the conditions now to those immediately preceding the slide of 1903, (f) the special danger to the stability of the North Peak block induced by the 1903 slide, (g) the evidence of the recent development of fissures in the North peak, and (h) the difficulty of forecasting the exact course of the threatened slide or slides - your Commission is agreed on the following conclusions namely:-

Irrespective of mining operations and because of existing conditions only, there is danger of a disastrous landslide from Turtle mountain. We are agreed that danger exists from what has hither to been called, in this report, the North Peak block. The size and position of this block is indicated on the "Map of Turtle Mountain and Vicinity showing Danger Area." The limits of the block have been roughly marked thereon by paying due attention to the analogy of the block which fell in 1903 (Figure 29, showing the splay of this slide), and to the attitude of the joint-planes in the mountain. In our opinion, the lower limit of this threatening block occurs at the outcrop of the zone of contorted beds in the limestone member (see Plate XV).

We are further agreed that the area likely to be overrun by the debris of this slide is shown with practical accuracy (as the "area endangered") on the "Map of Turtle Mountain and Vicinity showing Danger Area." In tracing the limits of this danger, your Commission has used the analogy of the 1903 slide and has allowed a fair "margin of safety," necessitated by accidential factors that might influence the course of the threatened slide.

Excepting the North Peak block, the South Peak block, and the fissured area between them, we believe that the danger of heavy slides into the Frank valley cannot be classed as imminent. Yet it should be carefully noted that, in the opinion of your Commission, both the estimate of the size of the threatening block and the area likely to be devastated have been conservatively estimated and so indicated on the "Map of Turtle Mountain and Vicinity showing Danger Area." It is impossible to deny the existence of danger to the part of the valley at and north of the mine shaft. We believe, however, that the new Rocky Mountain Sanatorium lies outside the zone of practical danger.

As already noted, we believed that there is danger of heavy slides from the South peak and from the fissured region just to the north. We have not mapped their probable course, since this would lie practically altogether in the already mined and now uninhabited area overrun by the 1903 slide.

On account of the dips of bedding and joints in the limestone of Bluff (Goat mountain, as locally named), we are of opinion that there no practical danger of a first-order slide from that mountain in its present condition (See Plate XIX).

## ABANDONMENT OF THE TOWN-SITE

The present shaft and mine buildings surrounding it, also the row of houses to the northwest of it, appear to be reasonably safe from the effect of a slide from Turtle mountain. Practically all the rest of the town-site should be abandoned. In the opinion of your Commission this should be done whether the mine is operated in the danger zone or not, on account of the unstable condition, from natural causes, of the North and South peaks.

Whatever the report of this or other Commission, the town can never be an important one on its present site, since there will always remain the dread of another calamitous slide like that of 1903. In spite of undoubted individual hardship, caused by abandonment of the present site, the town, on a new and safe site, might prosper as never before."

Reginald A. Daly,
(Signed) W.G. Miller,
George S. Rice.

FILE #
67.303 (box 94)

LOCATION
Provincial Archives of Alberta

Date: July 25, 1931

Author: B.R. MacKay
Department of Mines
Geological Survey of Canada

Title: Preliminary Report on Stability Conditions in Turtle Mountain

In the report on the stability of Turtle Mountain, MacKay discussed the geological structure of the mountain, which was found to be more complex than indicated in the 1911 Report of the Commission appointed to investigate Turtle Mountain. MacKay also discussed existing stability conditions under four sections; the north ridge and shoulder, the north peak, the saddle area between north and south peaks, and the south peak area. The conclusions of the report are quoted below.

## Conclusions

> "From the above it may be concluded that the structure of Turtle Mountain prior to the 1903 slide presented more unstable conditions than does the part of the Turtle Mountain crest line which now remains. The most unstable portion of the Mountain at the present time appears to be the South Peak area which is almost completely surrounded by fissures. The structural conditions at South Peak closely resemble those which are believed to have existed over most of the area on which the slide took place. Should a slide from this area of the magnitude indicated by the block bordered by the crevasses take place it will probably result in damming Crowsnest river, wiping out a portion of the motor highway and the Canadian Pacific Railway line at the east end of the present slide, endangering life, and destroying buildings and other property in the vicinity of the eastern end of the slide and Hillcrest station. The weight of rock embraced in the area surrounded by the fractures and in the form of a pyramid 300 ft. in height approximates 5,000,000 tons, a tonnage almost a twentieth of that which fell during the 1908 slide. A close check should be kept on the condition of this portion of Turtle Mountain, therefore, to determine whether the crevasses are getting wider or more numerous with the object that should such prove to be the case measures may be taken to reduce the danger either by blasting off portions of the Peak in the danger zone or by removing the buildings in the vicinity of

Hillcrest station, the Alberta highway across the eastern portion of the slide and possibly part of the O.P.R. tracks.

With the exception of the quarrying action by frost, rain and wind along the landslide scarp of Turtle Mountain the rest of the mountain appears to be in much the same condition as when mapped in 1911. This is especially true of the North Shoulder and although this part of the mountain with its precipitous cliff overhanging the old Frank townsite always presents the danger of a large block of the shoulder sliding off along joint planes that may be developed, for reasons stated in the body of this report, the writer is of the opinion that the probability of a rock slide of large dimensions from it taking place is less than that emphasized by the Commission. Nevertheless a close check should be kept on this part of the mountain to see if pronounced joint planes or other evidence of instability become apparent."

FILE #
67.303 (box 94)

LOCATION
Provincial Archives of Alberta

Date: Dec. 10, 1931

Author: J.A. Allan
Professor of Geology
Consulting Geologist
Department of Geology and Mineralogy
University of Alberta

Title: Report on Stability of Turtle Mountain
Crowsnest District, Alberta

In his report on the stability of Turtle Mountain, Allan discusses the Geology, Structure and Unstable conditions of Turtle Mountain. Allan stated that the geologic structure indicates that the north peak is more stable than the south peak which has a relatively weak foundation.

The conclusions and recommendations of the report are quoted below.

Conclusions and Recommendations

"1. My examination of Turtle mountain was only a preliminary one, but it was sufficient to convince me of present conditions on Turtle Mountain and of instability in South Peak in particular.

2. I see no reason for undue alarm or hasty action in the vicinity of the slide but I am convinced that the situation is sufficiently serious to warrant close consideration of the actual conditions.

3. The preliminary report made in the summer of 1931 by Dr. B.R. Mackay of the Geological Survey of Canada is a very timely one, and his warning of unstable conditions in the South Peak of Turtle mountain is warranted by the actual condition that exists. His final report and map on the district will no doubt contain fuller details. Dr. MacKay surveyed topographically Turtle mountain in 1911 so he was in the fortunate position of being able to compare conditions on the mountain at that date and 20 years later in 1931. His profile sections, copies of which accompany this report, show structural conditions in the mountain and indicate danger points in the structure.

4. The fissured condition on the top of Turtle mountain as I found them in October 1931 is shown in photographs attached to this report. The fissures in North Peak do not seem to have opened perceptably since the Commission Report of 1911 was made. The saddle between the North and South Peak is very badly broken, and at least one large block has become displaced since 1911. The slope on the scar face in the saddle is almost perpendicular for 300 to 400 feet and any jar to the mountain is liable to cause slides from this saddle area.

5. The top of the South Peak is badly fissured and some of the fissures are of recent origin. Unstable conditions exist in South Peak especially immediately south of the 1903 slide scar. There is a block of possibly 10 to 15 million tons of rock in an unstable condition in South Peak. If such a block became displaced it would endanger property and life from close to Hillcrest station, west about one third the distance across the 1903 slide. Any slide will widen out before reaching the bottom of the valley as is shown in the 1903 slide.

6. I do not anticipate any such large slide because the rock is so badly fractured and weak in character that it will tend to sluff off in smaller masses. There is a danger from masses becoming displaced, large enough to overlap the eastern side of the 1903 slide and the zone just east of the slide. Such a slide would cover the highway and at least the houses close to the old slide. Small slides that do not reach the bottom of the valley do occur, in fact one was reported to me by two residents of Bellevue to have been heard just two days before my visit in October.

7. The structure in Turtle Mountain might be sufficiently disturbed to cause a slide by any of three possible causes, or a combination of these, namely, (a) settlement of the old workings of the coal seam mined previous to 1903 and until 1910. There are old workings immediately below South Peak. (b) Earth tremors even though slight. (c) Frost action in the fissures and crevices. In my opinion the first of these is probably most dangerous.

8. The Hillcrest mine is removing coal from the east side of the South workings have been extended. It is very important that the extent of the workings to the west and towards the old Frank mine workings should be considered immediately, because a limit to the removal of coal towards the danger zone should be established without delay, not because of such workings endangering Hillcrest, but because of the danger of a slide being started on the east edge of the 1903 slide.

9. Consideration should be given to the removal of the highway and Trans-Canada telephone line from the base of Turtle mountain to some point north of the railway. A possible location is suggested which would eliminate danger from any slides and also would remove two dangerous railway

crossings. The suggested route follows the terrace from Bellevue to the slide and then along a depression in the slide to Frank at the west side of the old slide.

10. I do not consider that the Canadian Pacific Railway is in any serious danger at the present time, and unless a major slide should occur.

11. I would strongly recommend that conditions in Turtle mountain should be examined again in the springtime in 1932 and at frequent intervals and possibly stations should be established on South Peak at critical points where any movements might be detected.

12. In conclusion, I would repeat that I am not unduly alarmed at any immediate major disaster. I hope that conditions are such that small blocks will be displaced by natural causes thus relieving the overload on the steep west face of South Peak. Suggestions have been made to use artificial means for removing overload possibly by blasting. I am strongly opposed to this suggestion until more is known about actual conditions in South Peak."

FILE #
67.303 (box 94)

LOCATION
Provincial Archives of Alberta

Date: Nov. 22, 1932
Author: J.A. Allan
Professor of Geology
Consulting Geologist
Department of Geology and Mineralogy
University of Alberta
Title: Second Report on Stability of Turtle Mountain
Crowsnest District, Alberta

The second report on the stability of Turtle Mountain by Allan was based on field observations made during the final week in September 1932. The conclusions and recommendations of the report are quoted below.

Conclusions and Recommendations

"1. The first examination of Turtle Mountain was made during the first week of October, 1931, and the second examination was made during the last week in September, 1932. This second examination should have been made early in the summer, about June, because erosion and frost action is most active in April and May.

2. Observations made on stability conditions in Turtle Mountain in 1932 do not alter in any way the conclusions given in the 1931 report, except that proof was obtained that slides had occurred during this interval of eleven months.

3. In 1932, measurements were made on three particular crevices. These same three points were examined in 1932. One fissure had not widened perceptibly; one could not be found, possibly obliterated by a small slide; and the third had been removed by a slide. In the last case, a block of rock measuring approximately 50,000 cubic yards or about 120,000 tons had become displaced by sliding during the interval of eleven months. This had occurred in the most unstable part of South Peak.

4. In North Peak of Turtle Mountain there are major fissures to the west and to the south of the top of North Peak and only one crevice was observed on the north side of this peak. Some of these cracks are not shown in the 1911 map prepared by the Geological Survey of Canada for the Commission Report on Turtle Mountain.

5. The stability of North Peak is reduced by these cracks but there is less danger from slides from this peak than from other parts of Turtle Mountain. It is nevertheless advisable to make periodic inspection of these cracks.

6. The saddle or centre area is intensely fractured and blocks of rock will continue to become displaced from this area each year, particularly in the springtime by frost action, but it is not anticipated that any of the blocks will be large enough to reach the bottom of the valley or to cause property damage.

7. South Peak of Turtle Mountain is in an unstable condition. The upper three hundred feet of the peak offers a real menace to property and to the lives of those living within the danger zone.

8. The stability of South Peak is greatly reduced by the presence of major and minor crevices and transverse fissures on the north, west, south and east sides of the peak. Some of these crevices have either developed or widened since the 1911 survey as they are not shown on the map of that date.

9. Rapid erosion at the south end of the saddle area is backcutting South Peak and thus the stability is being further reduced. This undermining by erosion on the north west side of the South Peak is a major factor in producing instability.

10. It is generally conceded that the extraction of 245,000 cubic yards of coal from the old Frank mine under the base of Turtle Mountain was a large contributing factor to the disastrous 1903 Frank slide. It is known, according to Government records, that 548,000 cubic yards of coal were extracted from the same coal seam subsequent to the 1903 slide and most of this coal was taken from the base of South Peak. It is further concluded that the opening of crevices in South Peak since 1911 has resulted from settlement within the old workings of the Frank mine, developed since the 1903 slide. These old workings must be regarded as a second major factor contributing to instability of South Peak.

11. Plans showing the extent of workings in the Frank mine and in the north part of the Hillcrest mine have been compiled by the Department of Public Works. These two mines were operated on disconnected coal seams and the workings are not connected. It is concluded that the north workings in the Hillcrest mine have not been a principal contributing factor to instability in South Peak.

12. It is concluded that the town of Hillcrest is not within the danger zone related to South Peak in Turtle Mountain.

13. The unstable portion of South Peak is represented by a block containing approximately 3,000,000 cubic yards. A block of this size might become disconnected under any sudden disturbance. It is, however, the opinion that whereas such a slide is possible yet it is not considered probable

because the rock is so badly broken that smaller blocks will likely break away and thus prevent any major slide. The menace from slides is nevertheless present.

14. The suggestion has been made that the top of South Peak might be removed by blasting. It is concluded that such an operation is not considered economically advisable. It is, however, recommended that before any blasting operations are contemplated the field conditions be studies thoroughly by a competent explosive engineer. It has been pointed out in this report that many unstable blocks of rock could easily be displaced by blasting but it is not considered that the removal of such masses would insure stability in South Peak.

15. Two danger zones were mapped in 1931 that would be affected by a minor and major slide. A warning has been issued by the Government to those in the danger zone, but it would appear that only one or two families have accepted the warning. The major danger zone includes all houses from the east side of the rock slide to the Hillcrest Spur line. Those living close to the east side of the slide are in greatest danger as any slide large enough to reach the bottom of the valley would include the houses on the highway in the vicinity of the filling station.

16. It is recommended that those families in the danger zone should again be warned of the overhanging danger which might develop into a catastrophe at any time.

17. It is strongly recommended that early in the summer of 1933 the South Peak area should be surveyed and the position of the observable crevices should be recorded. Furthermore, stations should be established on certain crevices where measurements could be made periodically. By so doing any appreciable widening of the cracks could be observed. If any of these cracks are widening that information should be obtained without delay in the interest of human life and before it is too late. If there is movement on any of the crevices then all families should be removed to safety without delay.

18. Again it is repeated that South Peak of Turtle Mountain is in an unstable condition and in this danger area there is a menace to human safety east of the present slide.

19. A glass model of Turtle Mountain is being constructed on which the structure of Turtle Mountain and the fractured nature of the top of the mountain and other details will be shown."

FILE #
67.303 (box 94).

LOCATION
Provincial Archives of Alberta

Date: Aug. 16, 1933

Author: J.A. Allan
Professor of Geology
Consulting Geologist
Department of Geology and Mineralogy
University of Alberta

Title: Third Report on Stability of Turtle Mountain and Survey of Fissures Between North Peak and South Peak.

The third report on the stability of Turtle Mountain by Allan was based on field observations and a detailed survey of the fissures on top of the mountain which was completed in June and July, 1933. The conclusions and recommendations of the report are quoted below.

### Conclusions and Recommendations

"1. The map accompanying this report represents the results of a survey made in June and July, 1933, when the first attempt was made to map the major fissures and many of the minor fissures that occur on the top of Turtle Mountain.

2. Stations have been established on North Peak, South Peak and Third Peak. It is considered that North Peak and Third Peak are in relatively fixed positions, but South Peak may be moving downward and eastward. This statement must not be regarded as a fact, yet the opinion has been expressed by the writer that South Peak may have changed its position by moving eastwards since 1903 when the slide occurred. A line of levels was carried this summer between North Peak and Third Peak.

3. Gauging stations have been established at eighteen places; most of these are on active-looking fissures. The width of the fissure has been measured at points painted on opposite sides of the fissure. The recommendation is made that the width of the fissures at these same points should be measured at intervals in an endeavour to ascertain if any measurable movement is taking place on the top of Turtle Mountain. The position of each gauging station is shown on the map with this report. (plate 1).

4. Although the survey has defined several hundreds of fissures, yet there is an indefinite number of many thousands of small fissures that were much too small to show on any map drawn to a scale on which one inch on the map represents one hundred feet on the ground.

5. The fissures mapped vary in width from a few inches to a maximum of about 40 feet. The depth of those measured varies also and some of them were found to be open for over one hundred feet. The writer made observations in one crack 72 feet below the surface. The direction of the fissures downwards also varies but many have an inclination (dip) towards the east, that is to the steep face of the mountain and the 1903 slide scar.

6. There are two main systems of fissures. One system has a general north-south trend which is subparallel to the steep slide scar on the east face of the mountain. The other system is transverse to these strike-fissures and the direction is approximately east and west. There are numerous smaller oblique fissures and fissures that radiate from a centre such as occurs in South Peak area.

7. There is one major fissure which extends for a distance of 2500 feet along the top of Turtle Mountain. This fissure crosses the saddle between Third Peak and South Peak and extends in an irregular northerly course along the west slope to North Peak, where it passes out into the steep escarpment of the slide scar. The mass between this most westerly major fissure and the east face of Turtle Mountain represents about 4,600,000 cubic yards of rock. This mass is not regarded as unstable but is is made up of 5,000,000 cubic yards extremely fissured rock.

8. This same fissure at its southern end encircles South Peak on the west side and makes this Peak relatively unstable. The mass of rock lying between this western fissure and the east face of South Peak above an elevation of 7000 feet represents about 7,000,000 cubic yards.

9. There is shown on the map an island-like mass between the major break on the west and South Peak in which there are few fissures shown. Part of this surface is covered with talus, but there are no surface indications of major fissures under the talus. This is an important factor because, if a major catastrophe occurred in South Park, this area might remain intact as a less broken mass. In some respects such a mass is more treacherous than one with numerous large cracks, if movement occurred along the major west crack. A slide of this dimension would wipe out the main highway, the railway, the road to Hillcrest town, and would extend to the vicinity of Hillcrest station. A slide of these dimensions is unlikely at least without due warning, but it should be considered as possible.

10. The writer has expressed the opinion that there are small fissures that have opened up a few inches on the west slope

of the Saddle area since his examination was made in September, 1932, when only a few hours were spent on Turtle Mountain.

11. There appears to be a small block moving down the west slope from the saddle area towards Lyon creek. If this block should become dislodged it would do no serious damage in that direction; but might weaken the much broken mass in the saddle area along the eastern face. This area is the most fissured part of Turtle Mountain, but it is considered that slides in this section would not do serious damage in the Crowsnest Valley. However, any slide that might occur near the southern end of the saddle would certainly increase the instability of South Peak.

12. South Peak was found to be much more unstable than the writer thought it was in 1932. The most unstable block lies on the eastern face of South Peak area and extends down to about elevation 6950 feet or 250 feet below South Peak. This unstable mass represents about 3,000,000 tons or 1,300,000 tons or approximately on-thirtieth of the size of the 1903 slide. This is the area that requires careful consideration, and it is recommended that an examination of this area should be made at frequent intervals in the future. A slide of this dimension from this area would be a catastrophe. About one half of this mass would follow the old slide scar on the east side, but the other half would follow the east side of the 1903 slide and would spread out in the valley over a belt eight hundred to a thousand feet wide. This is a danger zone in respect to life and property. It would wipe out part of the motor highway and part of the road to Hillcrest, but it would not likely seriously affect the Canadian Pacific Railway.

13. It is recommended that the Mounted Police should be instructed to issue a warning to those climbing Turtle Mountain that Provincial Government stations that have been established must not be destroyed. Danger signs should be placed on both North Peak and on South Peak to warn climbers against subjecting themselves to grave danger by getting close to the edge, because there are overhanging blocks that cannot be seen to overhang from the surface.

14. A re-examination and remeasurement should be made of certain fissures, particularly those where gauge stations have been established. This should be done in the spring of 1934. Additional new stations might be established. Some of the other fissures should be checked from the map data now available. Photographs should be checked.

15. It is recommended that as a supplement to the surveys that have been made, a few vertical, aerial photographs should be taken over the top of Turtle Mountain.

16. It is advisable that the elevations of the three main peaks on Turtle Mountain should be established by_ geodetic methods, so that if there is any movement taking place in

South Peak it can be observed before any disaster occurs. It is recommended that this matter be discussed with the Geodetic Survey of Canada.

17. It is recommended that the Geodetic Survey of Canada be invited to install a seismograph at Hillcreat or vicinity in order to record any earth tremors that may be occurring. Local tremors could be differentiated from regional tremors.

18. It is recommended that those living in the danger zone should be again warned. It must be recognized that there is also danger of loss of life on the government highway. There are very few minutes in the day or night when motor cars are not crossing the slide. Close observation was made of this during the six weeks when the survey was being made. On many occasions there were ten motor cars on the slide at one time and the writer observed 14 cars all on the slide at once. The writer also received the criticism that if the Government did not consider the danger sufficient to protect those using the highway, those living in the danger zone would not fully realize their personel danger.

19. It is recommended that the highway should be moved from the danger zone and should be located on the north side of the Canadian Pacific Railway. This would also remove two dangerous railway crossings. If this were done, then that part of the Hillcrest road from the filling station on the main highway to the bridge across Crowsnest river should also be moved to some point farther down the valley.

20. Before any program entailing artificial removal of rock masses from Turtle Mountain is contempleted, an explosive engineer should be engaged to investigate the feasibility and the cost of removing sufficient rock to ensure safety from large rockslides in South Peak.

21. It is the opinion of the writer that the most feasible, the easiest and the cheapest remedy would be to change the motor highway and the Hillcrest road, move the few families in the danger zone and leave Turtle Mountain to the forces of Nature."

FILE #

Geotechnical Engineering Dept.
of Civil Engineering 106-1975

LOCATION

University of Alberta

Date: 1975
Author: D.M. Cruden and J. Krahn
(reprinted from) Rockslides
and Avalanches Vol. 1 Natural
Phenomena, pp 97-112
Title: Frank Rockslide, Alberta, Canada

The report by Cruden and Krahn entitled Frank Rockslide, Alberta, Canada is similar to a previous report by the same authors entitled A Reexamination of the Geology of the Frank Slide. In their second report, however, Cruden and Krahn have included a section on stability analysis. Rock samples were obtained for direct shear strength testing. They summarized this section by stating that shear-strength tests and the stability analysis indicate that the critical state of Turtle Mountain occurred before the slide. The abstract and discussion are quoted below.

## Abstract

"The landslide from the east face of Turtle Mountain that destroyed the southern end of the town of Frank in the Crowsnest Pass area of southwestern Alberta, Canada, has become a classic example of mass movement because it is one of the largest landslides for which eyewitness accounts and a contemporary scientific examination exist. Most accounts rely on reports published shortly after the slide's occurrence in 1903.

In these accounts the slide was reported to have moved down the dip of a steeply inclined set of joints and has therefore been classified variously as a rockfall or block flow. Later regional and geological mapping has shown that the crest of Turtle Mountain lay close to the axis of the Turtle Mountain anticline. A new detailed map shows that the slide mass lay on the steeply eastward-dipping limb of the anticline and the crest of the fold lay very close to the crown of the slide. The slide probably took place on bedding surfaces with the orientation of the scarp and lateral margins of the slide controlled by joint sets. A surface of rupture close to the toe of the slide followed a minor thrust above the Turtle Mountain fault. The phenomenon is better classified as a rockslide avalanche.

Shear tests on bedding planes in blocks taken from the slide debris give values for coefficients of friction on surfaces showing flexural slip close to those calculated for the slide mass with a factor of safety of 1. This strengthens the interpretation of the new failure mode proposed for the Frank slide."

## Discussion

"In its initial movement phase the Frank slide appears to be, in fact, a slide in which the major portion of the surface of rupture follows bedding planes. At the foot of the slide the surface of rupture seems to follow a flat-lying minor thrust fault above the Turtle Mountain fault. Structure to the south of the slide mass, along the trend of the Blairmore Range, is similar to structure in the slide area except that the minor thrust is not present. Therefore, it would seem that the presence of the minor thrust could have been a crucial factor in the stability of the slide mass; the chance of further major slides on this portion of the Blairmore Range will be considerably increased if other flat-lying discontinuities exist on the east face of Turtle Mountain.

The joints that have formed perpendicular to bedding are generally limited in size and not closely spaced, so it is likely that, in the early stages of the slide, the slide mass had some cohesion. Its early motion was probably as a rigid body along nearly continuous bedding and fault surfaces. The early stages of mass movement should therefore be classified as a rockslide rather than as a rockfall or block flow. As the Frank slide was considered an important example of a block flow (Coates, 1967, pp.6-12), we might conclude that block flows are less numerous and rockslides more numerous than previously thought. Similarly, the Frank slide is Ter-Stepanian's prime example of insequent creep. If creep preceded the slide, it should be described as consequent creep (Ter-Stepanian, 1966).

Striations observed on bedding planes are typical of flexural-slip folding, a style of deformation commonly associated in the Canadian Rockies with thrust faulting (Dahlstrom, 1970). We can expect slip on bedding places to be pervasive throughout the region. The effect of displacements resulting from these tectonic movements is both to eliminate some of the cohesion of the rock mass along bedding and fault planes and to reduce the friction angles for sliding in the direction of flexural slip.

It seems that the Frank slide results from the coincidence of a number of discontinuities in the rock mass: from the presence of two joint sets perpendicular to bedding, slip along bedding planes in the dip direction of the beds and from the presence of a flat-lying thrust fault. This association of fabric elements is not particularly unusual, and may occur across large areas of the Rockies. There is, indeed, evidence of other rockslides of the same magnitude throughout the area (Dishaw, 1967; Cruden, 1974)."

FILE #

QE599.C2 C955

LOCATION

Alberta Environment Library

Date: 1973

Author: D.M. Cruden and J. Krahn
(reprinted from) Canadian
Geotechnical Journal, Volume 10,
No. 4, 1973 pp. 581-591

Title: A Reexamination of the Geology of the Frank Slide.

In the report Cruden and Krahn discuss the history of investigation and the geology of Turtle Mountain. Cross-sections through Turtle Mountain as presented in reports by Daly et al, Allan, MacKay and Norris are given in figures 1 through 4. A bedrock geological map of the Turtle Mountain Area is presented in figure 5. Additional cross-sections and photographs are presented in figures 6 through 12. The abstract and discussion are quoted below.

## Abstract

> "The landslide from the east face of Turtle Mountain that destroyed the southern end of the town of Frank in the Crowsnest Pass area of southwestern Alberta has become a classic example because it is one of the largest for which eye witness accounts and a contemporary scientific examination exist. Textbook accounts rely on the reports published shortly after the slide's occurrence in 1903.
>
> The slide was thought to have moved down the dip of a steeply inclined set of joints and has therefore been classified variously as a rockfall or block flow. Later regional and geological mapping has shown that the crest of Turtle Mountain lay close to the axis of the Turtle Mountain Anticline. A new detailed map shows that the slide mass lay on the steeply eastward dipping limb of the anticline and the crest of the fold lay very close to the crown of the slide. The slide probably took place on bedding surfaces with the orientation of the scarp and lateral margins of the slide controlled by joint sets. The surface of rupture close to the toe of the slide followed a minor thrust above the Turtle Mountain Fault. The slide is better classified as a rock slide."

## Discussion

"The Frank Slide appears to be a slide in which the major portion of the surface of rupture follows bedding planes. At the foot of the slide the surface of rupture follows a flat-lying minor thrust above the Turtle Mountain Fault. Structure to the south of the slide mass, along the trend of the Blairmore Range, is similar to structure at the slide except that the minor thrust is not present. So it would seem that the presence of the minor thrust was a crucial factor in the stability of the slide mass; the chance of further major slides on this portion of the Blairmore Range will be considerably increased if other flat-lying discontinuities exist on the east face of the Turtle Mountain.

As the surface of rupture followed discontinuities (bedding planes and faults) that are typically continuous, and the discontinuities (joints) inclined to the surface of rupture are typically discontinuous, it is likely that the slide mass initially had some cohesion. Its early motion was probably as a rigid body. The early stages of mass movement should therefore be classified as a rock slide rather than as a rock fall or block flow. As the Frank Slide was considered an important example of a block flow (Coates 1967, pp.6-12), we might conclude that block flows are less numerous and rock slides more numerous than previously thought. Similarly, the Frank Slide is Ter-Stepanian's (1966) prime example of insequent creep. If creep preceded the slide, it should now be described as consequent creep.

The striations observed on bedding planes are typical of flexural-slip folding, a style of deformation associated, in the Canadian Rockies, with thrust faulting (Dahlstrom 1970). We can expect slip on bedding planes to be pervasive throughout the region. The effect of displacements resulting from these tectonic movements is both to eliminate the cohesion of the rock mass along bedding and fault planes and to reduce friction angles for sliding from peak values to close to residual (Patton and Deere 1971). Residual friction angles are typically about half the value of peak friction angles in hard rock.

As it seems that the Frank Slide results from the coincidence of a number of discontinuities in the rock mass, from the presence of two joint sets perpendicular to bedding, slip along bedding planes in the dip direction of the beds, and from the presence of a flat-lying thrust fault, we might notice that this association of fabric elements may occur across large areas of the Rockies. Ther is, indeed, evidence of other rock slides of the same magnitude throughout the area (Dishaw 1967)."

| FILE # | LOCATION |
|---|---|
| TA 706 C 74 1976 | University of Alberta Science Library |

Date: 1976

Author: John Krahn and Norbert R. Morgenstern
Rock Engineering for Foundations and Slopes Proceedings of a Special Conference, University of Colorado, Boulder, Colorado, 1976, pp.309-329.

Title: Mechanics of the Frank Slide

The report is presented in the following sections, the geology, shear strength tests, stability analysis, discussion of the stability analysis, initiating mechanisms and concluding remarks. The authors identified three types of discontinuities in the rock mass which are referred to as flexural-slip surfaces. Specimens of the discontinuities were shear tested and the results are presents in graphical form in figure 7.

The section on Initiating Mechanisms discusses the possible effect of mining as a cause of the Frank Slide. The abstract, a portion of the section on initiating mechanisms, and the concluding remarks are quoted below.

### Abstract

> "The Frank slide occurred along bedding in the east limb of the anticline composing Turtle Mountain. This geological interpretation differs from the classical section shown in most textbooks that portrays Turtle Mountain as a monocline with slip along jointing normal to bedding. The actual slip surface was controlled by flexural slip features that originated during folding.
>
> Laboratory tests have been performed on the discontinuities controlling the shearing resistence of the rock mass. Non-circular limit equilibrium analyses using these values gave factors of safety close to unity. An investigation of initiating mechanisms has also been carried out with special attention to the influence of the mining at the base of Turtle Mountain. Stability has been shown to be almost unaffected by the mining."

## Initiating Mechanisms

"Generally the stress analysis does not provide sufficient evidence to conclude that the mining initiated the slide. Several other factors have been suggested as possible initiating mechanisms (18). These are: (1) water pressures in the cracks on the top of the mountain, (2) ice wedging in the cracks on the crest, and (3) earthquake tremors. Since the slide occurred during the springtime when water from melting snow could have infiltrated the cracks at the crest of the slide, it is possible that some water pressure might have been acting. In order to assess the significance of tension cracks full of water, an arbitrarily chosen crack 200 feet (60 m) deep was assumed to fill suddenly with water. This had less than 1% influence on the overall factor of safety. The ice wedging was not analyzed; however, it is unlikely to have had a greater effect than that of water in the cracks."

## Concluding Remarks

"Factors of safety close to unity have been obtained from an analysis of the mechanics of the Frank slide. Conventional methods of limit equilibrium analysis have been used together with shear strength parameters measured on laboratory specimens of the controlling discontinuities. Quantitative case histories of large rock slides are rare and therefore it is of value to note that reasonable results can be obtained using well-established analytical and experimental procedures provided that the geological structure is understood correctly and that the rock mass is samples in an appropriate manner.

The results from this study can only be extrapolated to smaller slides with care. Due to the high stress level associated with the Frank slide, the stability was only slightly dependent on cohesion. The cohesion along distontinuities is often difficult to determine with accuracy and in smaller slides where it is more significant the role of laboratory tests in accurately predicting field behavior will be more limited. It should be emphasized that water pressures were not a dominant factor in the Frank slide and their presence in other cases makes the evaluation of stability more difficult.

It is difficult to ascertain what finally triggered the slide. Factors which have been cited as possible causes are ice wedging in cracks at the top of the mountain, earthquake tremors, water pressure effects and mining at the base of the mountain (18). Although small, none of these effects can be ruled out. Procedures for evaluating rock slope stability are not sufficiently sensitive to discriminate between them. Of over-riding concern in the case of the Frank slide has been the need to establish the correct geological structure and understand how geological processes have influenced the geotechnical behavior of the rock mass."

FILE # LOCATION

Contribution Series 1017 Research Council of Alberta

Date: 1980

Author: D.M. Cruden

(reprinted from) Canadian Geotechnical

Journal, Vol. 17, No. 2, 1980, pp.295-300

Title: The autonomy of landslides

In the report Cruden discusses a method to estimate the coefficient of friction of a sliding mass with a knowledge of the topography and density of the displaced mass pre and post slide. As an example a section through the Frank Slide is analysed. The abstract of the report is quoted below.

Abstract

"The accumulation of the displaced mass of a landslide is defined as that portion of the displaced mass of a landslide that overlies the original ground surface. The depleted mass is the portion of the displaced mass that overlies the rupture surface but underlies the original ground surface.

These terms are useful in discussing the dynamics of landslides. We show that knowledge of the topography and density of the displaced mass before and after sliding can lead to estimates of the coefficient of friction of the sliding mass. A section through the Frank Slide is analysed as an example."

## 4. INVENTORY OF SOURCES WHICH DO NOT PROVIDE UNIQUE AND/OR SCIENTIFIC INFORMATION RELEVENT TO THE TURTLE MOUNTAIN STUDY

The criteria for review of the material to determine its usefulness to the study was determined, in part, by the project manager, Mr. Don Prosser, of Alberta Environment. The criteria for placing references in this section are:

(a) the information is secondary in nature and is based on information published in reports or sources which are presented in other sections of the report.

(b) the information is thought to be unreliable. Due to the devestating nature of the Frank Slide, several 'stories' have been passed down which contain little or no truth. An example is the story of Frankie Slide being the sole survivor, and the belief that the entire town of Frank was destroyed.

(c) the information is of a non-scientific nature.

(d) the information presented does not relate to the Turtle Mountain Study. In several cases, the information reviewed did not refer specifically to the study area.

The above information is referenced below to provide a complete inventory of the files which have been reviewed.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Provincial Archives of Alberta

FILE # 77.315 OC

The Frank Sentinel, Newspaper May 2, 1903
The information is incorrect and is of questionable scientific value.

FILE # 81.153 SE

Photographs of Frank Slide in 1905
The pictures are very small and are of questionable scientific value.

FILE # 66.123 SE

Collection of photographs. There are several of Frank but they are lacking in quality.

FILE # 74.383 SE

Photographs of the "Great Rock Slide"
The file contains general photographs of the slide.

FILE # 68.31 SE

"Recollections of the Early Days"
The information is of very little scientific value.

FILE # 67.303 (Box 94)

The file on Railway Siding Agreements is of no value to this study.

FILE # 70.426 (on shelf)

Journals of the Legislative Assembly of the Province of Alberta 1906-1914
The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Provincial Archives of Alberta

**FILE # 80,250**

Annual Report of the Department of Public Works of the Northwest Territories

1901 & 1902 not included under the above file number
1903 - general reference to the Frank Slide pg. 12
1904 - general information with respect to mine improvements etc. pg. 16

Reports from 1905 to 1910 are included in file #66.149.

**FILE # 66.149**

1905 - important information re:fires pg. 18
1906 - general information pg. 83
1907 - general information pg. 43
1908 - general information pg. 108
1909 - general information pg. 100
1910 - general information pg. 81

**NO FILE # (on shelf)**

Alberta Historical Review

| | | | |
|---|---|---|---|
| Vol. 1 | No. 1 | pg. 8-13 | general information |
| Vol. 1 | No. 2 | pg. 3-4 | general information |
| Vol. 18 | No. 2 | pg. 29 | general information |

The above provides no significant information which relates to the Turtle Mountain Study.

**FILE # 74.1/250**

Annual Report of the Department of Public Works of the North West Territories 1901. The report contains general information such as the quality of coal at Frank.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Unlversity of Alberta Archives

9/2/6/2-20:3

Re: Gwilym Williams who was killed at Frank Disaster
The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Glenbow Museum Archives

FILE # M157

Bundy, Freda Graham
The above file contains short stories which are of little scientific value. Refers to Turtle mountain as the creeping mountain. Very similar to H.E. Vokes File # M327

FILE # M285

Craigie, Lillian Bertha. Scrapbooks. Contains a newspaper clipping titled "Frank Slide Recalled" which reports strange rumblings. (not dated).

FILE # D920.K29

Kells, Edna, 1935 Pioneer Interviews pg. 137

- "hour or two after slide ... found many little depressions in the rocks filled with water frozen solid. The vacuum created by the great falling mass had reduced the temperature to freezing".

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Glenbow Museum Archives

FILE # M562

Innes, William "Memoirs of a Pioneer Banker" pg. 38-41 states that the temperatures ranged in the 70's for some time before the slide followed by a sudden change the day before when the "thermometer fell to zero". The above information is stated in other sources such as in file #67.303 box 94, McConnell and Brock.

FILE # M676

Liddell, Kenneth Eric 1912-1975. Clippings etc. The Lethbridge Herald, April 28, 1953
The above provides no significant information which relates to the Turtle Mountain Study.

FILE # BE.32.A333C

Collection of pamplets etc. Contains an 'Alberta Government Travel Burear' leaflette titled 'the Frank Slide' which provides only general information which is better presented in other articles.

FILE # D364.971.S814

Notes on interviews with NWMP.
The above provides no significant information which relates to the Turtle Mountain Study.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Glenbow Museum Archives

**FILE # A.P648A f225 374, 435**

Pinder, George Z. Correspondence and plans. (mostly road & municipal surveys).

The above provides no significant information which relates to the Turtle Mountain Study.

**FILE # D971.23 D695**

Dore, Jackson. Collector. Statements of Dore family who were in the Frank Slide of 1903.

The above provides no significant information which relates to the Turtle Mountain Study.

**FILE # M322**

Dibney, Dora. Contains some information on the Frank Slide, however the information is neither scientific or unique.

**FILE # RCT-263**

James Kerr. April 3, 1980. Interviewer T.W. Ferkum

Mr. Kerr said he has pictures and all reports of Frank Slide. He also stated that the mine was not leaving enough pillers for the condition.

**FILE # RCT-88-5**

Interview with Frank Anderson by Gary Puckett, CFAC-TV.

Feb., 1972. Footage 808.

Mr. Anderson discussed the geology of Turtle Mountain (same as from other sources) and stated that timbers were crushing prior to slide, and that "a vast cavern had been mined out".

LOCATION:
Glenbow Museum Archives

**FILE # M517**

Higibotham, J.D. Clippings Frank Slide 1903. Contains information in terms of newspaper clippings which are of questionable value; contains the same information as given in files previously reviewed.

**FILE # D971.2 C212E**

Canadian Historical Association
The above provides no significant information which relates to the Turtle Mountain Study.

**FILE # 338.272 D652S**

The Saga of Turtle Mountain Coal
Refers to Turtle Mountain in Manitoba

**FILE # 338.272 A33a**

Alberta's Coal Industry 1919
The above provides no significant information which relates to the Turtle Mountain Study.

**FILE # M5640**

Kennedy Margaret, "Coke Ovens of Crowsnest Pass"
(pg. 49) All company survey plans and blueprints are in possession of Home Oil of Calgary (this refers to Lille operations which were owned by West Canadian Collieries).
The References Cited section was photocopied. No other information is of value to this study.

LOCATION:
Glenbow Museum Archives

FILE # M504

Green, Raoal 1906-1913
Letterbook as West Canadian Collieries employee, Crowsnest pass. Refers only to the mine at Lille.

FILE # BB.2.W524

West Canadian Collieries Annual Reports
The above provides no significant information which relates to the Turtle Mountain Study.

FILE # BL.C652

Coal Operators' Association of Western Canada. Correspondence and business papers of Alberta and B.C. coal associations 1906-1969.
Review only boxes 1, 6, 9, 10, 23, 24, 25, 26 as per outline. The other boxes are of no value to the Turtle Mountain Study.

FILE # 811 G561

The Western Producer. Oct. 30, 1958. Article by Crayford, S. Crayford was in Frank during the Slide and believed the slide was due to an explosion. The article has no value to the Turtle Mountain Study.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Archives Of The Canadian Rockies

FILE # 08.3 C88b p. 96-100

Brown, H. Leslie. The Pass Discussion of the Frank Slide based on R.G. McConnell and R.W. Brock of the Geological Survey of Canada. No unique information.

FILE # 08.3 C88co p. 89-93

Cousins, William James. A History of the Crowsnest Pass. Discussion of Frank Slide based on previous studies. Contains no unique information.

FILE # 03.1 B38 p. 41-47

Beaty, Chester B. The Landscapes of Southern Alberta A regional geomorphology. Basic text book discussion of the Frank Slide. Does not contain unique information.

FILE # 08.2 Al 1 al.

Provincial Archives of Alberta, Publication No. 2. Alberta at the Turn of the Century.

The above provides no significant information which relates to the Turtle Mountain Study.

FILE # 03.2 C88f Pam. ,

Cruden, D.M. and Krahn, J. Frank Rockslide Alberta, Canada. A copy of this report has been obtained from other sources. (see section III)

LOCATION:
Archives Of The Canadian Rockies

FILE # 08.3 F85b Pam.

Bradley, Byran F. The Mountain of Death from: B.C. Digest Volume 22, No. 1 Jan./Feb., 1966. Does not contain references. Refers to "roof settling" in mine, "Vertical timbers, two feet square, were crushed and splintered" and "the ground beneath them began to rock violently". This article is considered to be a questionable source of information due to its conflicting nature with other reports and a lack of references.

FILE # 03.2 C16t

Daly, R.A., Miller, W.G., Rice, G.S. Report of the Commission, Turtle Mountain, Frank, Alberta. The report is also in the Provincial Archives of Alberta file #67.303 (box 94). (see section III)

FILE # 08.3 F85a

Anderson, Frank. The Frank Slide Story. Story book style. Writes about the people involved. Contains no scientific information.

FILE # 02.4 F86 p. 217-218

Fraser, John Foster. Canada as It Is. Contains no information of value to the study.

FILE # 08.2 Al 1g

Gard, Robert. Johnny Chinook. Contains no information of value to the study.

LOCATION:
Archives Of The Canadian Rockies

FILE # 05 F751 p. 107-112

Gard Robert. In Jeopardy. Article is identical to File # 08.2 Al lg.

FILE 08.2 Al 1 fr. p. 162-167

Fryer, Harold. Alberta the Pioneer Years. Contains no information of value to the study.

FILE # 08.2 Al fry Vol. 1 p. 9

Fryer, Harold. Stops of Interest in Alberta. Contains no information of value to the study.

FILE # 02.4 G58 p. 145-146

Gomery, Percy. A Motor Scamper cross Canada. Contains no information of value to the study.

FILE # 02.5 J27 p. 109

Jagues, Florence Page. Canadian Spring. Contains no information of value to this study.

FILE # 02.5 K91 p. 97

Kroetsch, Robert. Alberta. Contains no information of value to the study.

FILE # 08.2 G79b p. 44

Gray, James H. Booze. Contains no information of value to the study.

LOCATION:
Archives Of The Canadian Rockies

FILE 04.2 H78

Hornaday, William T. Camp-fires in The Canadian Rockies. Contains no information of value to the study.

FILE # 05.2 OH 1g Pam.

Geddes, Gary. The Writer that Can Lit forgot. Contains no information of value to the study.

FILE # 02.3 T32

Thane, Eric. The Majestic Land. Contains no information of value to the study.

FILE # 03.6 W22m

MacEwan, Grant. John Ware's Cow Country. Contains no information of value to the study.

FILE 08.2 Al 1 mcg

MacGregor, James, G. A history of Alberta. Contains no information of value to the study.

FILE # 02.5 Al 1

Liddell, Ken E. This is Alberta. Contains no information of value to the study.

FILE # 04 R91r

Russell, Andy. The Rockies. Contains no information of value to the study.

LOCATION:
Archives Of The Canadian Rockies

FILE # 02.4 W64

Wilby, T.W. A motor tour through Canada. Contains no information of value to the study.

FILE # 03.1 G29z 235 251-53 275

Zaslow, Morris. Reading the Rock The Story of the geological survey of Canada 1984-1972. Contains no information of value to the study.

FILE # 03.6 C881

Lake, David Wayne. A study of landscape evolution in the crowsnest pass region 1898-1971. Contains no information of value to the study.

LOCATION:
Geological Survey of Canada, Rare Book Room

File # RD821.8B86b

Newmarch, C.B., Geology of the Crowsnest Coal Basin, British Columbia Department of Mines Bulliten No. 33, 1953 Discussion of the Fernie coal area.

File # MC82.8C21s

Author not specified, Summary Report of the Geological Survey Department for the Calendar Year 1901, No. 761, 1902. The above provides no significant information which relates to the Turtle Mountain Study.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Geological Survey of Canada, Library

File # MC82.821 Vol V

Selwyn, A.R.C., Geological Survey of Canada Annual Report 1891, Vol V pt AA pg 9-16. Contains a discussion of the general area with no specific reference to Turtle Mountain.

File # MC82.821 Vol XI

Dawson, G.M., Geological Survey of Canada Annual Report 1898, Vol XI pt A pg 20-23. Contains a discussion of coal mining in Fernie British Columbia.

File # MC82.821 Vol XII

Dawson, G.M., Geological Survey of Canada Annual Report 1899. Vol XII pt A pg 87-103. The above provides no significant information which relates to the Turtle Mountain Study.

File # MC82.821 Vol XIII

Dawson, G.M., Geological Survey of Canada Annual Report 1900, Vol XIII pt A pg 84-95. Contains a brief discussion on the Crowsnest Pass with no specific reference to Turtle Mountain.

File # MC82.821 Vol XIV

Leach, W.W., Geological Survey of Canada Annual Report 1901, Vol XIV pt A pg 69-81. Contains a general discussion of Crowsnest Pass area but does not refer specifically to Turtle Mountain.

File # MC82.821 Vol XV

Dowling, D.B., Geological Survey of Canada Annual Report 1903, Vol XV pt AA pg 83-91. The information provided does not refer specifically to Turtle Mountain.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Geological Survey of Canada, Library

File # MC82.821 Vol XVI

Daly, R.A., Geological Survey of Canada Annual Report 1904, Vol XVI pt A pg 91-100. The information provided does not refer specifically to Turtle Mountain.

File # MC82.8C21S 1907

Dowling, D.B., Geological Survey of Canada Summary Report 1907, pg 32-34. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1909

Schofield, S.J., Geological Survey of Canada Summary Report 1909, pg 135-138. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1910

Schofield, S.J., Geological Survey of Canada Summary Report 1910, pg 130-134. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1911

Schofield, S.J., Geological Survey of Canada Summary Report 1911, pg 158-164. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1912

Schofield, S.J., Geological Survey of Canada Summary Report 1912, pg 221-228. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:

Geological Survey of Canada, Library

File #M82.8C21S 1912

MacKenzie, John D., Geological Survey of Canada Summary Report 1912, pg 234-246. Contains a general geological discussion of the crowsnest pass and makes reference to the Turtle Mountain Anticline.

File # M82.8C21S 1913

Schofield, S.J., Geological Survey of Canada Summary Report 1913, pg 130-141. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1913

Ries, H., Geological Survey of Canada Summary Report 1913, pg 284-287. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1914

MacKenzie, J.D., Geological Survey of Canada Summary Report 1914, pg 41-51. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1914

Stewart, J.S., Geological Survey of Canada Summary Report 1914, pg 54-55. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1914

McLearn, F.H., Geological Survey of Canada Summary Report 1914, pg 62-63. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Geological Survey of Canada, Library

File # M82.8C21S 1915

Schofield, S.J., Geological Survey of Canada Summary Report 1915, pg 93-94. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1916

Author not specified, Geological Survey of Canada Summary Report 1916, pg 58-66. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1917

Rose, B., Geological Survey of Canada Summary Report 1917, pt C pg 28-35. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1918

Rose, B., Geological Survey of Canada Summary Report 1918, pt C pg 13-16. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1920

Dowling, D.B., Geological Survey of Canada Summary Report 1920, pt B pg 11-25. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1924

Ingall, E.D., Geological Survey of Canada Summary Report 1924, pt A pg 145-148. The above provides no significant information which relates to the Turtle Mountain Study.

## TURTLE MOUNTAIN STUDY
## ARCHIVE INVENTORY

LOCATION:
Geological Survey of Canada, Library

File # M82.8C21S 1930

MacKay, B.R., Geological Survey of Canada Summary Report 1930, pt A pg 154-179. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1932

Cockfield, W.E., and Walker, J.F., Geological Survey of Canada Summary Report 1932, pt A II pg 72-105. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1932

Hume, G.S., Geological Survey of Canada Summary Report 1932, pt B pg 1-68. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21S 1933

Mackay, B.R., Geological Survey of Canada Summary Report 1933, pt B pg 1-31. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 bulletin 37

Stalker, A.M., Geological Survey of Canada bulletin 37, 1956. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 bulletin 44

Norris, D.K., Structural Conditions in Canadian Coal Mines, Geological Survey of Canada bulletin 44. The above report does not discuss the Frank mine.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Geological Survey of Canada, Library

File # M82.8C21 memoir 24

Ries, H. and Keele, J., Geological Survey of Canada memoir 24, 1912. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 27

Daly, R.A., Miller, W.G., and Rice, G.S., Report of the Commission appointed to Investigate Turtle Mountain, Frank, Alberta, Geological Survey of Canada memoir 27, 1911. The above report is discussed under section III, Provincial Archives of Alberta. File # 67.303 (box 94).

File # M82.8C21 memoir 38

Daly, R.A., Geological Survey of Canada memoir 38, 1912. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 69

Dowling, D.B., Geological Survey of Canada memoir 69, 1915. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 76

Schofield, S.J., Geological Survey of Canada memoir 76. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 87

MacKenzie, J.D., Geological Survey of Canada memoir 87, 1916. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:

Geological Survey of Canada, Library

File # M82.8C21 memoir 112

Stewart, J.S., Geological Survey of Canada memoir 112, 1919. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 148

Walker, J.F., Geological Survey of Canada memoir 148, 1926. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 207

Rice, H.M.A., Geological Survey of Canada memoir 207, 1917. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 255

Douglas, R.J.W., Geological Survey of Canada memoir 255, 1950. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21 memoir 291

Douglas, R.J.W., Geological Survey of Canada memoir 291, 1958. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21r paper 36-1

Rice, H.M.A., Geological Survey of Canada paper 36-1, 1936. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Geological Survey of Canada, Library

File # M82.8C21r paper 41-12

Hage, C.O., Geological Survey of Canada paper 41-12, 1941. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21r paper 43-1

Hage, C.O., Geological Survey of Canada paper 43-1, 1943. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21r paper 46-10

Douglas, R.J.W., Geological Survey of Canada paper 46-10, 1946. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21r paper 47-23

Douglas, R.J.W., Geological Survey of Canada paper 47-23, 1947. The above provides no significant information which relates to the Turtle Mountain Study.

File # M82.8C21r paper 50-23

deWit, R., and McLaren, D.J., Geological Survey of Canada paper 50-23, 1950. The above provides no significant information which relates to the Turtle Mountain Study.

Museum Bulletins

National Museum of Canada Bulletins No. 2 pt V, VI; No. 4; No. 35; No. 44; No. 49 and No. 58. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Geological Survey of Canada, Library

File # RD.7C21 Vol 20

Canadian Mining Journal, Vol. 20, 1901. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 24

Canadian Mining Journal, Vol. 24, 1905. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 25

Canadian Mining Journal, Vol. 25, 1905. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 26

Canadian Mining Journal, Vol. 26, 1906. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 27

Canadian Mining Journal, Vol. 27, 1906. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 28

Canadian Mining Journal, Vol. 28, 1907. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Geological Survey of Canada, Library

File # RD.7C21 Vol 30

Canadian Mining Journal, Vol. 30, 1909. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 31

Canadian Mining Journal, Vol. 31, 1910. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 33

Canadian Mining Journal, Vol. 33, 1912. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 34

Canadian Mining Journal, Vol. 34, 1913. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7C21 Vol 44

Canadian Mining Journal, Vol. 44, 1923. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.8C21 Vol 51

Ignatieff, A., et al., Conditions and occurrences in the Canadian coal mining industry, Canadian Mining Journal, Vol. 72, 1951. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Geological Survey of Canada, Library

File # RD.7C21 Vol 54

Canadian Mining Journal, Vol. 54, 1933. The above provides no significant information which relates to the Turtle Mountain Study.

File #RD.8C21b bulletin 156

Allan, J.A., Geology of Alberta Coal, Canadian Institute of Mining and Metallurgy, Bulletin No. 156, 1925, pg 387-405. The above provides no significant information which relates to the Turtle Mountain Study.

File # RD.7E57 Vol 73

Brewer, W.M., Coal fields on Crowsnest Pass branch of the Canadian Pacific Railway Alberta Territory, Engineering and Mining Journal, Vol 73, 1902, pg 757-758. Brewer discusses very briefly the fact that the coal seam in the Frank Mine is nearly vertical. Only two paragraphs refer to the Frank collierie.

File # RD.8C21 Vol 15

Author not specified, Notes on the progress of development work in coal areas of Alberta and Saskatchewan, Canadian Mining Institute, Transactions, Vol. 15, 1912, pg 354-363. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Geological Survey of Canada, Library

File # RD.8C21 Vol 5

Smith, F.B., Coal Mining in the Northwest Territories and its probable future, Canadian Mining Institute, Journal, Vol. 5, 1902, pg 104-112. The above article mentions the Canadian American Coal and Coke Company, but does not provide any significant information.

File # RD.8C21 Vol 7

McEvoy, J., Notes on the special features of coal mining in the Crowsnest, British Columbia, Journal of the Canadian Mining Institute, Vol. 7, 1904, pg 500-504. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Public Archives of Canada

File # RG 45 Vol. 141 Book 51

Dowling, D.B., Geological Survey of Canada Field Note Book, 1902. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 45 Vol. 141 Book 52

Dowling, D.B., Geological Survey of Canada Field Note Book, 1902. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Public Archives of Canada

File # RG 45 Vol. 141 Book 53

Dowling, D.B., Geological Survey of Canada Field Note Book, 1902. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 45 Vol. 219 Book 492

Leach, W.W., Geological Survey of Canada Field Note Book. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 45 Vol. 219 Book 494

Leach, W.W., Geological Survey of Canada Field Note Book. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 15 Vol. 322 file 75897

Personnel file re: Pearce, Wm. The above provides no significant information which relates to the Turtle Mountain Study.

File # MG 26, G C 800 72638

Laurier Papers, April 30, 1903. Copy of a telegram which is also contained in the letter dated May 4, 1903, file # 9/2/6/2-20:2, from the University of Alberta Archives.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Public Archives of Canada

File # MG 26, G C 800 72641

Laurier Papers, April 29, 1903. Telegram from General Superintendent Jamieson to D. McNicoll stating "...top of the mine is burning. The night shift of 50 or 60 men in it...air filled with particles of coal and great excitement". Due to the conflicting nature of the above comments with other reports, the information is not considered to be of value to the study.

File # MG 26, G C 800 72731

Laurier Papers, May 1, 1903. Telegram from the Frank Board of Trade requesting aid. The above provides no significant information which relates to the Turtle Mountain Study.

File #MG 26, G C 800 72745

Laurier Papers, May 1, 1903. Telegram from Clayton to Sir Wilfred Laurier. The above provides no significant information which relates to the Turtle Mountain Study.

File # MG 26, G C 800 73445-73449

Laurier Papers, requests for aid. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 45 Vol. 51 file 3232

Personnel file re: Dowling, D.B. 1920-1935. The above provides no significant information which relates to the Turtle Mountain Study.

TURTLE MOUNTAIN STUDY
ARCHIVE INVENTORY

LOCATION:
Public Archives of Canada

**File # RG 45 Vol. 46 file 2712**

Personnel file re: Brock, R.W. 1926-1935. The above provides no significant information which relates to the Turtle Mountain Study.

**File # RG 32 C-2 Vol. 31**

Brock, R.W. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

**File # RG 32 C-2 Vol. 26**

Boyd, W.H. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

**File # RG 32 C-2 Vol. 672**

Daly, W.P. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

**File # RG 32 C-2 Vol. 171**

McConnell, R.G. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

**File # RG 32 C-2 Vol. 179**

McKay, R.B. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

LOCATION:
Public Archives of Canada

File # RG 32 Vol. 179 file 75897

Pearce, Wm. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 32 C-2 Vol. 119

Haanel, Eugene. Historic Personnel file. The above provides no significant information which relates to the Turtle Mountain Study.

File # RG 18 Vol. 1527 file 139

North West Mounted Police records. The above provides no significant information which relates to the Turtle Mountain Study, however names of individuals employed by the C.P.R. are provided. These are, McHenry, engineer, Jameson, general superintendent, Taylor, divisional superintendent and MacKenzie who was a divisional engineer with C.P.R. All of the above personnel were in Frank during the initial investigation immediately after the slide in 1903.

## 5. ADDITIONAL SOURCES OF INFORMATION

Throughout the study period many people were contacted for information relevent to the Turtle Mountain Study. The people contacted ranged from residents of the Crowsnest Pass to retired mining inspectors. Home Oil Company Ltd., the present title holder of the Frank Mine and Lorry Felske of Oxbow Historical Research Ltd. were also contacted for information.

In most cases, the information was secondary in nature, based on information published in reports, magazines and newspaper clippings.

A list of additional sources and a description of the information received from the sources is provided below.

| Source | Title | Information |
|---|---|---|
| Lorry Felske | Oxbow Historical Research Ltd. | - list of references |
| Patrick McCloskey | Historian | - referred to Fort Steele Historic Park |
| Neil Duncan | Energy Resources Conservation Board | - referred to Duncan Brown - ex mining inspector |
| Keith Gladwyn | Energy Resources Conservation Board | - the mining plan of the Frank mine is incomplete. Mr. Gladwyn will be updating the plan using plans located at the Glenbow archives and will forward a copy to Alberta Environment. |
| Stan Stefanowski | Home Oil Co. Ltd. | - reviewed West Canadian Collieries files. Relevant information is contained in appendix 6. |
| Margaret Kennedy | Lifeways | - referred to Canadian Mining Journal |
| Ceese Fabro | Resident of Crowsnest Pass | - no information |
| Larry Ewashen | Currently writting a book on the Pass | - no information |
| Mrs. Spatuk | Crowsnest Historical Society | - no information |
| Doug Phillips | Canadian Pacific Railway (Calgary) | - currently reviewing files for information |
| Omar Lavallè<br>David Jones | Canadian Pacific Railway (Montreal) | - currently reviewing files for information |
| Tom Patching | Professor, University of Alberta | - referred to Duncan Brown, Martin Ashaker and Harry Sahay |
| Duncan Brown | Retired mining inspector | - is familiar with the Frank Mine and will locate fires on the completed plan |

| Source | Title | Information |
|---|---|---|
| Martin Ashaker | Retired mining inspector | - left a set of mining reports from late 1800's to 1970's to Occupational Health and Safety. A great deal of information has been destroyed |
| Harry Sahay<br>Greg Smith | Occupational Health and Safety | - no information. It is believed that the inspector's reports, file #77.237 at the Provincial Archives of Alberta are the reports which Martin Ashaker referred to |
| Bill Tracey<br>Les Hurt | Alberta Culture | - referred to Lorry Felske |
| Tom Nesmith | Archivist, Public Archives of Canada | - will forward pertinent information |
| Doug Tedford | Geological Survey of Canada | - will forward pertinent information |
| Don Herperger | Provincial Archives of Saskatchewan | - no information |
| David McIntyre | Blairmore Visitors Centre | - referred to Alberta Culture |
| Drummond Cavers | Hardy and Associates (Vancouver) | - referred to Albert Goodwin |
| Darryl White | Fort Steele Historic Park | - received copies of four photographs from the Fort Steele Historic Park collection |
| Arther Graham | Survivor of the Frank Slide | - discussed his impressions of the slide |
| James Kerr | Resident of the Crowsnest Pass | - information based on reports, and newspaper articles |

| Source | Title | Information |
|---|---|---|
| Ed Potter | Retired mining inspector | - doesn't think mine workings are still collapsing, however some subsistance is still occurring |
| Mr. King | King and Young, Blairmore | - King and Young occupy the West Canadian Collieries office in Blairmore. The office has since been cleared of all records from coal company |
| Albert Goodwin | Retired from West Canadian Collieries; Belleview Mine | - robbing of the pillars was not an uncommon practice in coal mining |
| Russ Pacey | Vancouver | - received copies of photographs of the summit of Turtle Mountain in 1958 |

Lorry Felske of Oxbow Historical Research has been conducting research for Alberta Culture on the Crowsnest Pass including the Frank Slide.

A list of references prepared by Mr. Felske is presented below.

## TURTLE MOUNTAIN STUDY

## OXBOW HISTORICAL RESEARCH LTD.

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| File #<br>9/6/6/1-4<br>W. Pearce<br>Papers | Location<br>University of<br>Alberta Archives | | | |
| May 4, 1903 | W. Pearce | J. Smart<br>Dep. Min<br>of Interior | -slide aftermath<br>-speculation re: causes | -"small rock slides continue"<br>-"heat produced almost suffocating gas causing report volcanoes"<br>-"uncertain whether or not tunnel materially injured; probably not"<br>-"probability of further danger to town"<br>-report of fissures, some ten feet in width, 500' deep<br>-"caused by system of mining adopted" |
| May 5, 1903 | W. Pearce | J. Smart<br>Dep. Min<br>of Interior | -descript. of mine before slide | -"two walls left parallel...nothing between them" |
| May 14, 1903 | W. Pearce | C.W. Baker<br>Ed. Engineering News | | -"two gentlement... with Geo. Surveys Branch... investigating cause" |
| May 18, 1903 | W. Pearce | C.W. Baker<br>Ed. Eng. News | | -"It may take considerable time before all disturbances ... cease" |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| August, 1981 | Madison Canyon Earthquake Centre<br>P.O. Box 520<br>West Yellowstone<br>Montana, 59758 | L.W. Felske | -publ. avail. upon request | -earthquake triggered slide, 80 million tons, occurred Aug. 17, 1959 |
| File #<br>Box 10<br>File 62<br>West. Can. Coal Oper. Assoc. | Location<br>Glenbow Archives | | | |
| Dec. 12, 1917 | | Director of Coal Operations | | -discusses rate for miners extracting pillars in "Old Mine" at Frank |
| 1902 | W.W. Leach | "The Blairmore-Frank Coalfields" Geological Survey of Canada Annual Report, Vol. XV, New Series, 1902-1903, Part B | | -1902, "output will be largely increased within a short time"<br>-coal high in ash<br>-main entry in 4500'<br>-general description |
| File #<br>RG 45 Vol. 218<br>File 1902 Leach<br>#1769-1771 | Location<br>Public Archives of Canada | | | |
| 1902 | W.W. Leach | Notes | | -80 rooms working in Frank mine |
| 1906 | Fernie *Free Press* | Crow's Nest Pass Illustrated in Fernie Centennial Library | | -takes two months to fix mine after slide<br>-nothing else of use |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| June, 1903 | Editor | "The Rock Slide at Frank"<br>Canadian Engineer | | -photographs of rock slide<br>-miners report "workings practically intact"<br>-general descriptions of extent of slide<br>-see appendix 7 |
| June 11, 1909 | L.D. Burling | "The Landslide at Frank" | | -"Cracks had been noticed on the back slope" before slide<br>-see appendix 7 |
| May 30, 1903 | W. Blakemore | "The Frank Disaster" Canadian Mining Review Vol. XXII, No. 1 | -man. for Crow's Nest Pass Coal Co., when 130 men killed at Coal Creek in 1902 | -personal interview with imprisoned miners<br>-crevices atop Turtle Mt. the fall of 1902<br>-condition of mine before slide<br>-see appendix 7 |
| June 4, 1903 | W. Pearce | "The Great Rockslide at Frank, Alberta" Engineering News | | -slide description<br>-miners' escape route<br>-see appendix 7<br>-includes Brock and McConnell |
| July 4, 1903 | W.E. Dowlen | "The Turtle Mountain Rock Slide" Engineering and Mining coal co. Journal | -geologist for Frank coal co. | -slide description<br>-inspected mine, intact after slide<br>-observed crevices atop Mt. |
| May 7, 1903 | F.B. Smith | "The Frank Disaster Canadian Mining Review | -mine inspector | -description of mine before 1903<br>-description of miners' escape |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| May 11, 1903 | Raoul Green | No title | -man. for many years after in Pass, knowledgeable | -miners in same part of mine so damage to remainder unknown<br>-descrip. of mining technique |
| May 1, 1903 |  | Spokesman-Review Spokane newspaper | -scattered issues examined, detailed descrip. of events after slide | -general descrip. of slide<br>-temperature drops 40° in 48 hours[1] |
| April 30, 1903 |  | Spokesman-Review | -some facts not found elsewhere | -general descrip. of slide<br>-shock of rock fall shakes buildings off foundations[1] |
| May 2, 1903 |  | Spokesman-Review |  | -miner makes way into mine, says everything fine[1] |
| May 2, 1903 |  | Frank Sentinel Frank newspaper |  | -general descrip.<br>-"massess of rock still rolling from Mt."[1] |
| June 1, 1905 |  | "No Fire in Frank Mine" | -mine reopened, fire out<br>-some details | -underground fire[1] |
| Oct. 25, 1901 |  | "The Coal Mine" | -shows speed of mine opening | -mine development before slide[1] |
| April 30, 1903 |  | "Awful Rock Slide Cranbrook | -concerned descrip. as many relatives of Cranbrookians in Frank<br>-sensationalized descriptions | -mine in process of changing owners[1] |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| May 7, 1903 | | "Looks Better at Frank" Cranbrook Herald | -mostly descrip. of activity in town | -"the mine is not damaged work will be resumed"[1] |
| May 28, 1903 | | "He Talks About Frank" Cranbrook Herald | -E.C. Spriggs, dir. of co. | -main entry in 9000' |
| May 21, 1906 | R. Barnwell Fuel and Tie Agent for C.P.R.) | "Western Coals" | -talk to a gathering of C.P.R people<br>-shows a market for Frank coal encouraging quick development at their mine | -Frank mine given direct encouragement to operate by C.P.R.[1] |
| File #1<br>Box 52<br>File 548<br>C.P.R. Papers | Location<br>Glenbow Alberta Archvies | | | |
| File #<br>R.W. Brock Papers<br>Box 1 and 2 | Location<br>Special Collections<br>University of British Columbia | | | |
| 1921-1935 | | | -file list only examined<br>-nothing relating to Turtle Mt. | |
| Dec. 4, 1979 | Archives McGill Uni. | L.W. Felske | -many minig eng. trained at McGill<br>-nothing relating to Frank Slide | |
| March 22, 1979 | R.G. Blackader<br>Geological Survey of Canada<br>601 Booth St.<br>Ottawa, Ont. | L.W. Felske | -returning request re: location of mine models from Crow's Nest Pass<br>-models destroyed | |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| 1979 | Bancroft Library and Archives<br>Universtiy of California,<br>Berkeley, California<br>94720 | | -personal visit<br>-holds some material on Crow's Nest Coal mining companies<br>-nothing on Frank mines | |
| File #<br>77.237/49a-i<br>Mine Inspector's Reports | Location<br>Provincial Archives of Alberta | | -most concise source on Frank coal mine | -underground workings<br>-mine maps, not complete |
| Oct. 1906 | National Map Library,<br>Public Archives of Canada<br>Ottawa | Frank Fire Insurance Map | -primarily shows town<br>-gives location of tipple | -tipple of Frank coal mine |

Research concerning the coal mine workings at Frank suffers from the lack of detailed company papers. In an attempt to uncover other sources, extensive correspondence was undertaken with archives/libraries/other repositories in the northwestern United States. The principal mine owners, Henry L. Frank and Samuel W. Gebo had extensive business and political connections in Wyoming, Montana, and Washington states. No major collection has been found to date, although a great deal of biographical information concerning these men had been located. To a considerable degree, this information relates to the mining experience of both men, and consequently addresses the question of how mining problems at Frank may have been addressed due to similar conditions encountered in the United States. In the case of S.W. Gebo, a fluency in French, and frequent trips to France on behalf of the United States government, suggest the origin of mine workings at Frank trying to follow the "French Plan", a point brought out in the Mine Inspector's Papers, Accession 77.237/48a-i, at the Provincial Archives of Alberta. Gebo's French Canadian background, and familarity with France also explains the later sale of the Frank coal property to French interests. These, and other aspects of the careers of Frank and Gebo which relate to the coal mine workings at Frank, and consequently to the stability of Turtle Mountain, are detailed in the following list of correspondence and printed material.

| | | | | |
|---|---|---|---|---|
| Nov. 1, 1982 | Butte Free Public Library | L.W Felske | -no significant holdings[1] | -bio. of H.L. Frank supplied |
| Feb. 28, 1983 | Wyoming State Archives | L.W. Felske | -no holdings[1] | |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| Nov. 16, 1982 | same | L.W. Felske | -clippings, info. re Gebo[1] | |
| Nov. 19, 1982 | Uni. of Wyoming Special Coll. | L.W. Felske | -no material[1] | |
| Nov. 9, 1982 | Seattle Public Lib. | L.W. Felske | | -clippings re S.W. Gebo[1] |
| Nov. 1982 | Bridger Public Lib. | L.W. Felske | | -clipping re S.W. Gebo[1] |
| Nov. 2, 1982 | Judith Gap Public Schools Lib. | L.W. Felske | -possible source of oral history contacts re Gebo<br>-no documents[1] | |
| Nov. 9, 1982 | Seattle Times Library | L.W. Felske | -no clippings re Gebo or Frank | |
| Oct. 20, 1982 | Great Falls Library | L.W. Felske | | -clipping re Gebo[1] |
| Dec. 2, 1982 | Washington State Archives | L.W. Felske | -no info. | |
| Nov. 30, 1982 | Uni. of Wash. Library | L.W. Felske | -no info. | |
| Nov. 16, 1982 | Hist. Society of Seattle | L.W. Felske | -some info. | -S.W. Gebo, Seattle addresses and relatives[1] |
| Mar. 7, 1983 | Rocky Mt. College | L.W. Felske | -no info. | |
| Feb. 24, 1983 | U.S. Dept. of Interior Bureau of Land Management | L.W. Felske | -no ref. to Gebo in indexes | |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| Dec. 1, 1982 | Cincinnati Hist. Society | L.W. Felske | -checked indexes, no ref. to H.L. Frank | |
| Nov. 29, 1982 | Public Lib. of Cincinnati and Hamilton County | L.W. Felske | | -clippings re career of Henry L. Frank[1] |
| Dec. 23, 1982 | United Jewish Cemetry Cincinnati | L.W. Felske | -some info. re Frank's family<br>-possible source of oral history contacts[1] | |
| Nov. 23, Nov. 9, Nov. 17, 1982 | Montana Hist. Society/Archives | L.W. Felske | -no major collection | -clippings re H.L. Frank and S.W. Gebo[1] |
| Nov. 29, 1982 | Montana Coll. of Mineral Science and Technology | L.W. Felske | -no collection re H.L. Frank<br>-Frank was founding director of the College | |
| Mar. 2, 1983 | G.T. Grant | L.W. Felske | -G.T. Grant, niece of Samuel Gebo<br>-supplied details of Gebo's career | -S.W. Gebo[1] |
| Dec. 1, 1982 | Mrs. T.D. Gebo | L.W. Felske | -married to nephew of Samuel Gebo | -S.W. Gebo[1] |

The following relatives of S. Gebo were written to, but no response was received: D.A. Gebo, Portland, M.S. Gebo, Portland, R.J. Gebo, Portland. Addresses are found in the appendix.

| | | | | |
|---|---|---|---|---|
| Nov. 1982 | W.H. Gebo<br>Box 993<br>Red Loge, Mt.<br>59068<br>446-2069 | L.W. Felske | -nephew of S. Gebo<br>-no sign. info. | |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| Nov. 1982 | T.A.L. Nicholas | | | -article on S.W. Gebo[1] |
| Nov. 1982 | L.W. Felske | Canadian Coal Consolidated<br>113 Rue Reamur<br>Paris, France | -previous address of Frank coal co.<br>-no reply | |
| Nov. 10, 1982 | L.W. Felske | Canadian American Coal and Coke Col<br>63 Rue de Provence<br>Paris, France | -same | |
| Jan. 31, 1983 | J.C. Charbonnier<br>3 Rue Fresnel<br>75116, Paris<br>France | L.W. Felske | -son of former manager of West Canadian Collieries<br>-contacted re: WCC but may have info. regarding French investors in Frank mines | |
| Sept. 1983 | M. Progent<br>38 BIS<br>Rue Du Marchal<br>Joffre 06 Nice<br>France | L.W. Felske | -contacted re photos he sent to Bellevue re mines there<br>-grandson of West Canadian Collieries founder, J.J. Fleutot<br>-may have Into. on other French investors in Frank mines | |
| Dec. 1982 | Notman Photo Archives<br>McCord Museum<br>Montreal, Quebec | L.W. Felske | -no photos of Frank | |
| Feb. 1983 | Canada Institute for Scientific and Technical Information<br>National Research Council<br>Ottawa | | L.W. Felske | -supplied articles re: Frank Slide in 1903 mining journals, previously described |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| Jan. 17, 1983 | Civil Archives Division National Archives Washington, D.C. | | -no info. in U.S. Bureau of Mines or Geological Survey collections re Frank Slide | |
| Jan. 27, 1983 | Scientific, Economic and Natural Resources Branch Civil Archives Div. National Archives Washington, D.C. | | -no info. re Frank Slide in U.S. Geo. Survey field notebooks, files destroyed in fire | |
| Nov. 10, 1913 | Blairmore Enterprise | "Judicial Sale" | -complete listing of all land, and equipment owned by Canadian Coal Consolidated Ltd., placed for judicial sale | -Canadian Coal Consolidated Ltd., holdings and equipment |
| 1932 | B.R. MacKay | "Geology and Coal Deposits of Crowsnest Pass Area, Alebrta" Canada, Dept. of Mines, Geological Survey, Summary Report, 1932 Part B | | -discussion of Turtle Mt. geological features, with crosssection map |
| 1983 | L.W. Felske | Production Graph-Frank Mine | -production graph prepared from a variety of sources | -Frank production[1] |
| 1983 | L.W. Felske | Men employed, and accidents, Frank Mine | -prepared from a variety of sources | -men employed and accidents at Frank mine[1] |
| File #<br>Box 201<br>File 1981<br>C.P.R. Papers | Location<br>Glenbow Archives | | | |
| July 8, 1904 | | | -brief, scattered references to the Frank mine are found in these papers | -coal poor for first 5000' waste mixed in coal, after 5000' coal o.k. |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| Mar. 21, 1912 | Blairmore Enterprise | | -scattered reference to Frank mine | |
| Aug. 1966 | J. Roberts | "Recollections of the Alberta Coal Branch" Reprinted for private circulation from Edmonton Geological Society Guidebook, Eighth Annual Field Trip, Cadomin, Alberta | | -a mine opened in the Coal Branch named "Gebo" |
| June 20, 1907 | Frank Paper | | -many issues of this newspaper missing | -blast in new slope blew out a "couple of sets" in main entry |
| pre-1920 | | R.C.M.P. Papers Public Archives of Canada, Ottawa | -a well organized collection but only scattered references to mining at Frank | |
| 1901-1018 | Mines Branch | Annual Reports | -detailed lists of mine plant additions, and general info. on underground developments | -underground developments |
| 1905<br>1909-1913 | American Institute of Mining Engineers-Bulletin<br>Uni. of Alberta Lib. | | | -no references to Frank mines |
| 1904-1905<br>1908-1916<br>1921<br>1931-1932 | American Institute of Mining Engineers-Transactions<br>Uni. of Alberta Lib. | | | -no references to Frank |
| 1900-1940 | Canadian Institute of Mining-Journal<br>Uni. of Alberta Lib. | | | -no references to |

| Date | From/Author | To/Title | Findings | Key Words |
|---|---|---|---|---|
| 1909<br>1925 | Engineering and Mining Journal<br>Uni. of Alberta Lib. | | | -no references to Frank |
| 1918 | Western Canada Coal Review<br>Uni. of Alberta Lib. | | | -no references to Frank |

Notes: 1. a copy of the letter or document can be obtained from Mr. Don Prosser, Earth Sciences Division, Alberta Environment.

## 6. CONTINUING STUDY

The Turtle Mountain Study Archive Inventory presents information found to date on the Frank Slide, Frank Mine, the geological setting and stability of Turtle Mountain.

Additional information will be received by Alberta Environment as it is found by the various contacts and members of the Turtle Mountain Study Group. It is suggested that Alberta Environment update the appropriate sections of the inventory with any additional information.

## Appendix 1.1

Provincial Archives of Alberta
File #77.237/48b

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS
OFFICE OF INSPECTOR OF STEAM BOILERS

4797

FILE 967

Lethbridge April 16th 1901

Sir

I beg to draw your attention to the very serious condition of the new Coal Mine at Blairmore Springs operated under the management of S.W. Gebo Esq Blairmore

Mr Gebo is I believe one of the owners.

The seam of coal lies perpendicularly and is 13 feet thick

From the one wall the coal for about 6 feet of its thickness is of a rather soft shaly character, the balance of the thickness is a much harder coal

A level tunnel has been driven in for a distance from the entrance of about 600 feet

The whole thickness of the coal has been taken out leaving the side walls (of Rock) smooth and bare

The over hanging coal extends above

the level tunnel to the top of the hill a distance of about 500feet, this represents a weight of over 100000 tons, in case of the least possible giving away of that vast body of coal, nothing could possibly prevent the whole of it crushing down with fearful force and killing every person in the mine

Two sets of men are now busily setting timber along the level tunnel but in the event of the above crisis any timber would be but like matchwood

A very different method ought to have been applied to operate that seam of coal

I was not instructed to inspect the said mine, but only to obtain a sample of the coal and therefore have not reported upon it in the regular way

Your obedient Servant
D Evans.
Insp of Mines
NWT

The Deputy Comr
Pub Works Dept
Regina

14711

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

OFFICE OF INSPECTOR OF STEAM BOILERS

Box 320
Calgary
April 23rd 1901

FILE 967

Sir

I beg herewith to enclose a description and rough sketch showing how the present dangerous state of the Blairmore Springs Coal Mine may be remedied

I may explain that I felt reluctant for various reasons when at Regina to suggest methods for the better management of such a mine, I was also under the impression that the duty devolving upon an Inspector was simply to point out any danger that was found to exist in any mine.

As you know from past experience at a certain other mine in the Territories suggestions from myself as to methods of management were ignored until they were compelled to resort to them

However the danger in this case is serious and have decided to lay before you as fully as I can, both a remedy for the present danger and

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

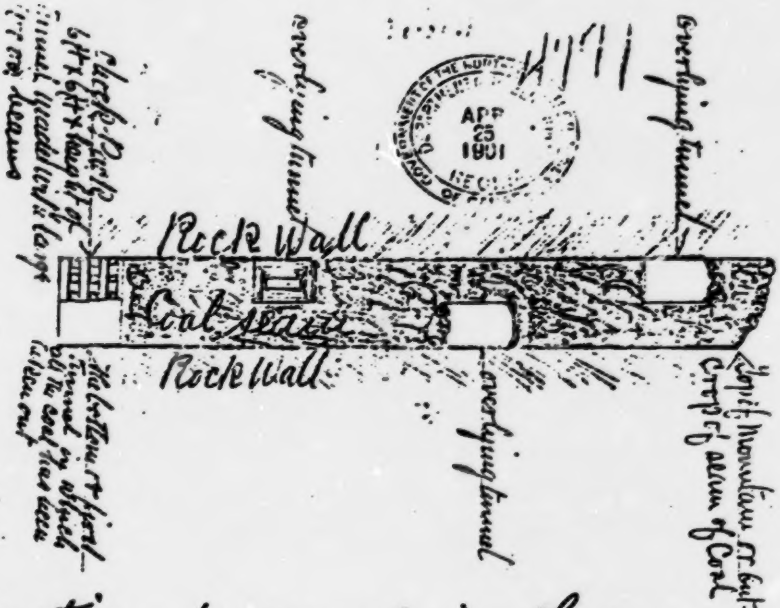
OFFICE OF INSPECTOR OF STEAM BOILERS

FILE.

a safer method of management for the future operation of the Blairmore Springs Coal Mine

Your obedient Servant
D. Evans
Insp of Mines
N.W.T.

The Deputy Commissioner
Public Works Department
Regina


overlying tunnel
overlying tunnel
overlying tunnel
Rock Wall
Coal seam
Rock Wall
Top of mountain out-crop of seam of Coal
the bottom or first tunnel in which all the coal has been taken out
Chock-pack 6ft x 6ft x height of tunnel

4771
APR 25 1901

Rough sketch of Seam of Coal at Blairmore Springs Coal Mine

Suggestions for remedying the present danger and methods for future operations of the said mine

The above rough pencil sketch represents the seam of coal known at present as "The Blairmore Springs Coal Mine."

The seam lies nearly perpendicularly, there may be a slight inclination but hardly visable.

The whole seam rests upon its own mass and not upon a sill of rock as in the case of inclined or flat seams.

In the bottom, or first tunnel marked on the sketch the coal has been taken out the whole thickness from wall to wall leaving no support for the overlying mass of coal, and which extends to a vertical height of 500 feet above the tunnel to the outcrop at the top of the mountain, and the said tunnel being driven in a distance of 600 feet from the entrance, so that this mass of coal for 600 feet having a thickness of 13 feet and height of 500 feet has no other support than the adhesiveness of the coal to the rock walls on either side, excepting ordinary sets of timber

APR 25 1901

put up in the ordinary way along the tunnel and which are of no practical value for the purpose intended, the conditions being altogether out of the ordinary

In the sketch, I have marked a "Chock Pack" of large wood blocks to be ~~put~~ built along the Bottom or first tunnel the whole length from entrance to face on the left side where the coal is hardest occupying about 6 feet of the width of the tunnel and wedged very tightly to the overlying coal

These "Chock Packs" should have as many inside cross timbers as possible to prevent crushing in the center

Strict instructions should be given that the whole thickness of the coal should not be taken out in any of the underlying or overlying tunnels which are intended to be driven

They should rather be driven in the alternate sides of the seam but governed by the hardness or softness of the coal as shown in the sketch

With said tunnels being about 200 feet more or less one above the other the weakening of the support would be almost nothing

I have attempted to sketch one of the overlying tunnels perspectively to give the idea as plain as possible

The outcrop of the seam runs down to the entrance to the Bottom or first tunnel and the seam extends ~~under~~ through the flat diagonally across the valley the river running across the outcrop and the seam doubtless runs to a great vertical depth

Just at the entrance to the first tunnel a

vertical

vertical shaft has been sunk for some depth and I learned that it was intended to continue sinking said shaft (as soon as the water was got out) to a depth of 35 feet

If a level tunnel at that point should be driven in like manner as the first tunnel taking out all the coal, it would certainly be serious, as there will be water (through the river crossing the outcrop) running dow both sides of the coal softening the soft shale which lies ~~next to the rock wall~~ betwee the coal and the rock walls making the coal less adhesive to the walls, the bulk of coal above will also be so much heavier

In such a case the massive arch I sugge (when at Regina) with foot walls built far into the side rock walls of the tunnel would b the only remedy

If the rough sketch is not plain enough, shall be glad to answer any further question

D. Evans
Insp of Mines
N W T

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

ADDRESS YOUR REPLY TO
THE DEPUTY COMMISSIONER
DEPARTMENT OF PUBLIC WORKS
REGINA

REFER TO
FILE 4797. Hy.

DO NOT WRITE ABOUT MORE THAN
ONE SUBJECT IN ONE LETTER

REGINA May 2nd, 1901.

Dear Sir,

With reference to the letter addressed to you on the 24th, ultimo, relative to the inspection by Mr Dan. Evans, our Inspector of Coal Mines, of your Coal Mine at Blairmore, I now enclose for your information copy of a report received from Mr Evans containing suggestions relative to the manner, in which he recommends, that the mine which you are now operating should be developed.

This is forwarded to you simply for your information, as it is thought that you may possibly like to have the views of our Inspector as to the manner of operating the mine so as to cause as little risk as possible to the miners employed.

Yours truly,

Deputy Commissioner.

S. W. Gebo, Esq.,
Blairmore,
Alta.

**SUGGESTIONS** for remedying the present danger and methods of future operations of the said mine.

The above sketbh represents the seam of coal known at present as"the Blairmore Spring Coal Mine".

The seam lies nearly perpendicularly, there may be a slight inclination but hardly visable. The whole seam rests upon its own mass and not upon a sill or rock as in the case of inclined or flat seams.

In the bottom or first tunnel marked on the sketch the coal has been taken out the whole thickness from wall to wall leaving no support for the overlying mass of coal, and which extends to a vertical height of 500 feet above the tunnel to the outcrop at the top of the mountain, and the said tunnel being driven in a distance of 600 feet from the entrance, so that this mass of coal for 600 feet having a thickness of 13 feet and height of 500 feet has no other support than the adhesiveness of the coal to the rock walls on either side, excepting ordinary sets of timber put in in the ordinary way along the tunnel and which are of no practical value for the purpose intended. the conditions being alltogether o out of the ordinary.

In the sketch, I have marked a "Chock Pack" of large wood blocks to be built along the bottom or first tunnel the whole length from entrance to face on the left side, where the coal is hardest, occupying about 6 feet of the width of the tunnel and wedged very tightly to the overlying coal.

These "Chock Packs" should have as many inside cross timbers as possible to prevent crushing in the center.

Strict instructions should be given that the whole thickness of the Coal should not be taken out in any of the underlying or overlying tunnels which are intended to be driven.

They should rather be driven in the alternate sides of the seam, but governed by the hardness or softness of the coal as shown in the sketch.

With said tunnels being about 200 feet more or less one above the other the weakening of the support would be almost nothing.

I have attempted to sketch one of the overlying tunnels prospectively to give the idea as plain as possible.

The out crop of the seam runs down to the entrance to the bottom or first tunnel and the seam extends through the flat diagonally across the valley across the valley the river running across the outcrop and the seam doubtless runs to a great vertibal depth.

Just at the entrance of the first tunnel a vertical shaft has been sunk for some depth, and I learned that it was intended to continue sinking said shaft(as soon as the water was got out) to a depth of 350 feet.

If a level tunnel at that point should be driven in like manner as the first tunnel taking out all the coal, it would certainly be serious, as there will be water(through the river crossing the outcrop) running down both sides of the coal softening the soft shale which lies between the Coal and the rock walls making the coal less adhesive to the walls.

to the walls, the bulk of coal above will also be so much heavier.

In such a case the massive arch I suggested (when at Regina) with foot walls built far into the side rock walls of the tunnel would be the only remedy.

If the rough sketch is not plain enough, I shall be glad to answer any further questions.

sgd. D. Evans,
Insp. of Mines,
N.W.T.

le-4797. Ry.

BLAIRMORE, ALTA.

MAY 12 1901

4191

MAY 15 1911

To Deputy Commisioner

Department of Public Works

REGINA

Dear Sir

I have your communications of ~~May~~ Apl 24th & May 2nd I was away in Winnipeg when your letter arrived, and now hesten to reply.

In regard to the opening of this property, i started and drove a tunnel, on a level driving into the mountain for a distance of 27 ft, taking the coal out the entier width of the vain, which is 12 ft, and about 7 ft high, without using a stick of timber of any kind, for that distance, I also drove a tunnel paralell with this one for that distance, 20 ft above, the other as the vain is very near perpendicular, i have got the lower tunnel timbered to the face with haevy legs and collars, well lagged, i am now timbering the upper tunnel the same way, using one for the intake air, & the other for the return. I am now getting a fan, to put at the mouth of the lower tunnel, to ventilate the mine.

We have now 107 ft of cover at the face of our entry, but the raise is very abrupt, we will get an addition 200ft in driving 400 ft more

Regarding the safety of the miners, i may say that i have been operating for the last 7 years in Montana, and coal mining for 20 years, and have never yet had an accident to a man in my employ, and shhall always have the safety of the miners in view, at no matter what expense to my company.

I may mention a coal mine in Montana that is in operation in Montana, and has been operated for the last 12 years, that is similar in pitch to this, but the coal is

No 2 -

very soft in nature,with soft walls,there has never been any powder used in the mine since the commencement,that is to produce coal,this mine is at Chestnut.There have been less accidents in this mine than in any mine in the state of Montana.

With reference to the plans enclosed in your second letter,I expect to be in Calgary in a few days,and will discuss the best methods of working with Mr Evans.

I am ready at any & all times to do anything that will be an advantage to our property,and for the safety of the men.

I am sir

Your obedient servant

MANAGER

P.S.-

We have up to now encountered no signs of gas in our workings.

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA 4797

DEPARTMENT OF PUBLIC WORKS

ADDRESS YOUR REPLY TO
THE DEPUTY COMMISSIONER
DEPARTMENT OF PUBLIC WORKS
REGINA

59491

488

REFER TO
FILE

REGINA

DO NOT WRITE ABOUT MORE THAN
ONE SUBJECT IN ANY LETTER

No 48. Blairmore Springs Mine. File No. 4797

J. S. Dennis Esq.
Deputy Commissioner
Regina.

I beg to submit to you my report on the inspection of Blairmore Springs Mine operated by S. W. Gebo Esq.

This mine was opened up as a prospect in December 1900. and has been carried on very much on prospecting lines till within the past month or two when it really became a shipping mine and well forward in the way of development.

The seam lies from 2 to 5 degrees from the Vertical and varies very much in width. At the opening on the lower Tunnel the seam was twelve (12) feet in thickness and now in the upper Tunnel which is 44 feet above the seam has widened to 22 feet. The upper Tunnel has now been driven about 1400 feet and the narrow workings above this are carried on regularly with the lower works thereby keeping the ventilation well into the face of the new ground being opened.

Ventilation is at present by a furnace but a Fan is on order and will likely be in place in the course of a month.

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

[illegible]

[illegible]

FILE________

[illegible]

2

The method employed here of working the seam is practically a modification of the long-wall system, with narrow work carried ahead of the stoping. In Stoping the miners stand on top of the Coal and as long as the breasts are kept full up there is very little chance of danger to practical miners from falling Coal as they are so close to their work.

I have suggested to Mr Gebo, who is Acting Manager, to increase the Pillar between the Haulage Gangway and the parallel narrow Gangway, to (40) forty feet which he has promised to attend to.

At this Mine they are working three (3) shifts of 8 hours each but on any one shift there are never more than (16) sixteen men in the mine at one time, so that for the present they are well within that clause in the Ordinance dealing with the daily Supervision of a Certificated Mine Manager. However Mr Gebo has promised to have a man appointed as Manager also a Pit and Fire Boss (certificated) as soon as examination can be held for granting the same.

In the meantime it might be well, should you consider it advisable, to issue a permit to Mr Gebo or one of his Pit Bosses (Cyrus Morris) as Manager

3

so that operations can be carried on without interruption so long as not more than (20) twenty men are employed in the Mine at one time.

No inflamable gas has yet been found in the mine but I have impressed upon Mr Gebo the necessity of at once establishing a system of Daily Reports, a Register of Employees and Special Rules similar to that in use at the Lethbridge Mines.

I am Dear Sir
Your Obdt Servant
Frank B. Smith
Inspector of Mines

Calgary
25th Sept 1901

4797

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

Refer to
File 4797
Do not write about more than one subject in any letter

Calgary 4th April 1903

No 48

Sir,

I beg to submit my report on No 48 Mine which I visited on the 30th March after hearing rumors with regard to the safety of some of the working places. On this inspection I visited all the working rooms and found Rooms 11, 10, & 9 in a very unsafe condition. After explaining the matter to the General Manager Mr Gebo, he at once made a complete change in the underground staff which he had already been contemplating. After waiting a day and personally meeting the new staff I feel satisfied that it will be a great change for the safety of the men and the mine. I visit them again in three weeks.

Your Obdt Servant
Frank B. Smith
Inspector of Coal Mines

B. J. Saunders Esq
Regina

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

4797

Address reply to
The Deputy Commissioner
Department of Public Works
Regina

Refer to
File 4797
Do not write about more than
one subject in any letter

No 48

Calgary ~~Regina~~ 4th Apr. 1903.

Sir, I beg to submit my report on No 48 Mine operated by The Canadian-American Coal & Coke Co. Ltd Frank, Alta. This Mine I visited on the 13th 16th & 17th March and when their all the places I visited were in very fair condition. The workings of two rooms being quite safe for men to work in and the ventilation in excellent condition. No obstruction could have been possible in the air course as there is only one way for it to go. With the places I visited and the air being good satisfied me on the fair conditions of the mine.

Your Obdt Servant
Frank B. Smith
Inspector of Coal Mines

B. J. Saunders Esq
Regina

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

Address your reply to
The Deputy Commissioner
Department of Public Works
Regina

4797

Refer to
File 4797

Do not write about more than
one subject in any letter

No 48

Calgary ~~Regina~~ 9th July 1913.

Sir, I beg to submit my report on No 48 Mine operated by the Canadian-American Coal & Coke Co. Frank. Alta.

The Company are now lowering the river and the lower tunnel is in sight where they are going to instal a new fan. No other new work has been done on the tunnel & ventilation will not be restored until the fan gets to work. The new shaft is down 110 feet in coal and all covered in on top protecting the men working below. The new drifts on the north end of the property are being developed and a siding built to the openings. These different openings I will have to give a new number to in time so that the Department records will be complete.

Your Obd^t Servant
Frank B. Smith
Inspector of Coal Mines

B. J. Saunders Esq
Regina

4797. ah September 1st, 1903.

Sir,

With reference to the disaster which occurred at Frank last April by the slide from Turtle Mountain, during my last trip to the western portion of the Territories, it was reported to me from one or two sources that the Management of the Canadian-American Coal & Coke Company, Frank, had expressed themselves to the effect that the mine was not contributary in any way towards the disaster.

You will doubtless remember upon meeting me at Frank the second day after the slide, you were somewhat of the opinion that the mining operations might have been a primary cause of the slide, and later in your report of June 3rd you stated you have visited the mine into which an opening had been made in the main tunnel, which was followed for a distance of about1400 feet and the timbers were found practically intact throughout this whole distance. The overman informed you at the same time that in as far as No. 5 manway a distance of over 4000 feet conditions were similar.

From this

Frank B. Smith, Esq.,
Inspector of Coal Mines,
Calgary. Alta.

From this it would appear that the mine had nothing to do with the disaster. Still, the Department would like to be informed if from any later investigation you are of the opinion that the mine was not tributary in any way. You will, of course, readily understand that the Management is naturally very anxious to not be held responsible for the slide in anyway and it is with a view of having something down on file that I am writing you at this length.

Probably it would be well to have a thorough examination made of the mine with this object in view as soon as the new fan is installed or earlier and would be prepared to either accompany you myself or send another Official of the Department to go with you.

Your obedient servant,

Deputy Commissioner.

4797

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

FILE 4797

15/1138

Calgary 9th Dec 1903.

No 48

Sir, I beg to submit my report on No 48 Mine operated by The Canadian American Coal & Coke Co. Ltd Frank. Alta.

These workings are now divided into three (3) different openings, designated on the Company's books as the Main Entry (old mine) No 2 or North side Tunnel & The Shaft midway between these two. It might be as well on our records to so name them keeping the records on the same file.

The main Entry or old working have not advanced any since my visit in August. They have been driven out by gas and as yet have failed to make a good return connection to the surface altho there is about 5000 cub. ft of air passing thro the workings but not along a road that is travable. They expect to get a road thro in the course of ten days which will enable them to again begin development. In the meantime they are very careful to have nothing but locked safety lamps inside the district that is dangerous.

A new certificated manager has been appointed and he is most careful in following out all the provisions of the law.

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

(2)

FILE 4497

No 2 or the North side Tunnel is progressing favorably and is now in over 1100 feet with a parallell gangway above carrying the ventilation which is quite sufficient for all purposes.

"The Shaft" has been sunk to a depth of 360 feet with levels driven off to each side & upraises made to connect with another level half way down the shaft. At present they are straightening out the shaft preparatory to development work.

Your Obdt Servant
Frank B. Smith
Inspector of Coal Mines

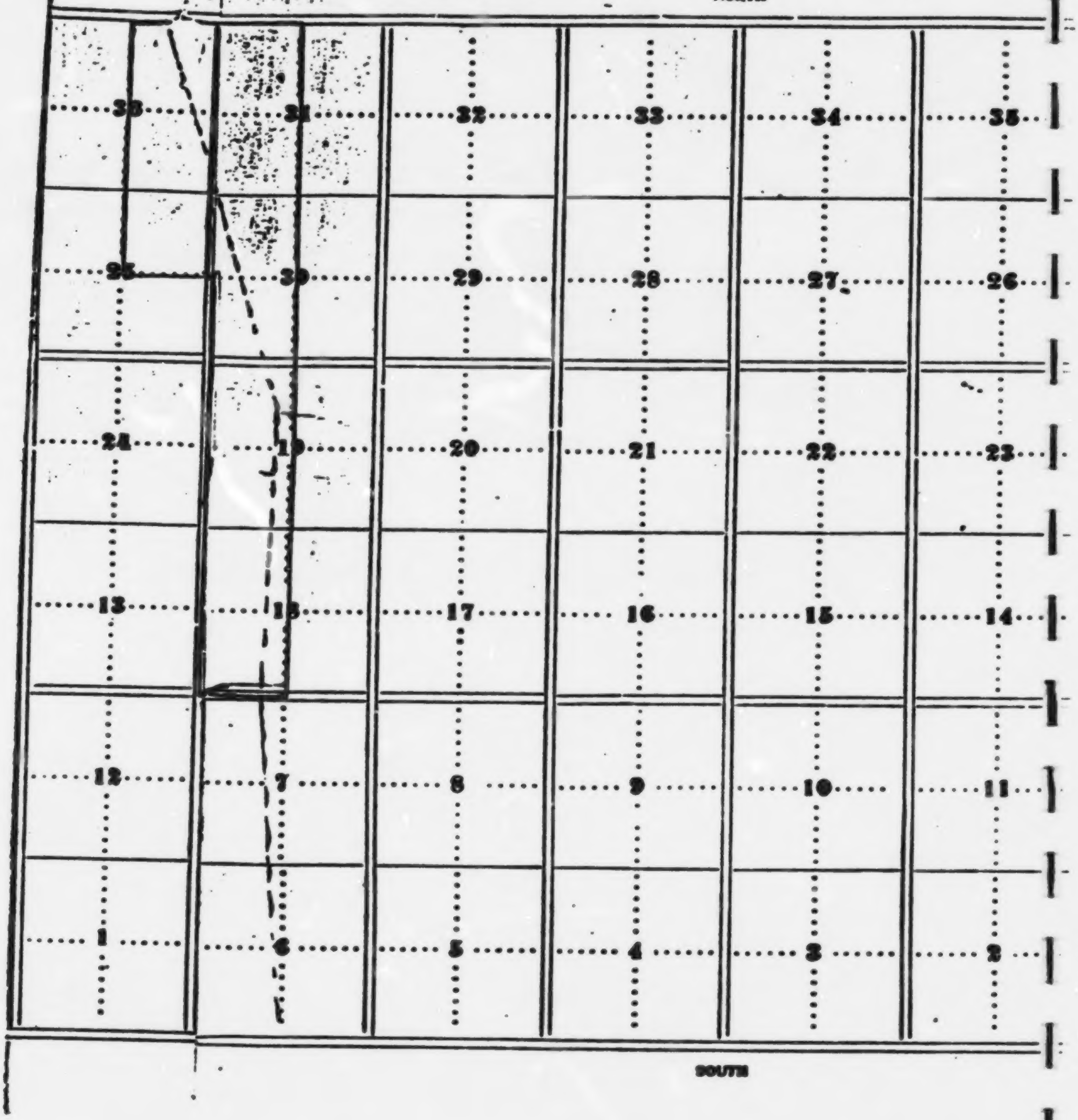
B. J. Saunders Esq
Deputy Commr.
Regina

file 4

Land owned by Canadian-American Coal & Coke Co, Ltd

Frank Alberta

TOWNSHIP 7 RANGE 3 WEST OF 5th MER.



NEWLY FURNISHED,
BA[illegible]ULL STOCKED
HEA[illegible]TERS FOR COMMERCIAL

THE COSMOPOLITAN HOTEL

H. HOWARD, PROPRIETOR.

COMMODIOUS SAMPLE ROOM
TABLE UNSURPASSED
AND MINING MEN.

2893

177501 Blairmore Alta, June 1 1904
4797.

Sir

Your attention is respectfully needed at present to the numerous accidents occurring on the Frank Mine. caused by incompetent officials. On two occasions the officials of that mine have exploded gas. injuring themselves & endangering the lives of the workmen. The mine is in a dangerous condition. lack of ventilation. I am on behalf of workmen asking you to give a thorough inspection before ~~there might~~ to avoid calamity.

Yours Truly
J. A. McDonald

copy made.
7/12/4.

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

[illegible]

REFER TO FILE 2073. 4797

[illegible]

See letter of 1st [illegible]

Letter [illegible]

Calgary, 14th June 1903.

Sir, I beg to acknowledge receipt of yours of the 11th with enclosure. I note the letter & feel that my letter to you of the 1st "re" Canadian-American Coal Co. Mine at Frank was well timed. (File 4797)
It might be well to notify Mr. J. A. McDonald that instructions have been given to use safety lamps. This letter emanates from the Miners Union. With regard to the incompetency of officials that is a matter of opinion & cannot very well be taken up by the Dept. without a lawsuit & probable heavy expense with expert testimony with regard to efficiency. Should you think it desirable I can again go to Frank, but if my instructions of the 1st are carried out carefully there is really no immediate danger. Awaiting your instructions.

[illegible] instructed
File 4797

Yours Obdt. Servant
Frank B. Smith
Inspector of Coal Mines

John Stocks Esq
Deputy Commr.
Regina

COPY.

Original on File No. 4797.

Blairmore, Alta. December 13/04.

Commissioner of Public Works,
Regina.

Dear Sir,-

I have once more to call your attention to the dangerous condition of Frank Mines . The mines are quitting for want of timber and owing to the seam changing pitch, timber is more needed than ever. You inspector Mr. Smith paid a visit to the mines yesterday under the influence of intoxicants and only went as far as the main entry and did not ascend the rooms at all. If my request this time does not draw your attention I will be obliged to send a circular to each member of the house.

Iam, Yours respectfully,

(Sgd) D. A. MacDonald.

Remember that we are short of ventilation and the mine gaseous.

4797. B December 16th, 1904.

JS

Sir,-

For your information I am enclosing with this a copy of letter that has reached the Department from Mr. J. A. McDonald of Blairmore, making complaint against yourself and complaining about unsafe condition of the Canadian American Coal & Coke Company's Mine at Frank. You will recollect a communication from this gentleman dated June 1st last, and that you had previously reported upon mine. Under date July 4th you were written as follows:"With further refemence to your letter of the 14th ult., on the matter of a complaint which has been raised against the management of the Canadian American Coal Co's mine at Frank, I have to say that the management was instructed as advised by you to use safety lamps until their mine was properly ventilated. It would seem advisable for you to make another inspection of this mine to see that these instructions have been carried out, allowing of course, reasonable time for action by them.", and since the above date we do not seem to have had a report from you on the mine in question. The charges are, undoubtedly, very grave, and I wish you would favor us with an explanation at the earliest possible date. A copy of Mr. McDonald's letter has been sent to Mr. Gebo for his information.

Your obedient servant,

F. B. Smith, Esq.,
Inspector of Coal Mines,
Calgary, Alta.

puty Commissioner.

Henry L. Frank,
President

G. B. Wilson,
Secretary and Treasurer

Samuel W. Gebo,
Vice-President and General Manager

THE CANADIAN-AMERICAN COAL & COKE CO., LIMITED

Head Office, Coal Mines and Coke Ovens
Frank, Alberta

4797

DEC 1904

FRANK, ALBERTA, December-19th-1904

~~2898~~

Mr. Jno. Stocks, Dep. Com. Public Works.

Regina, Assa.

21489

Dear Sir:-

Your letter of the 16th inst is received and we hasten to reply to same for we agree with you that the cahrges are very serious. We know of no better way to refute them than to send you the report of the Pit Committe of the Miners Union, which was made on the very date of the complainants letter. The report speaks for itself and we will make no comments. We do not know this man D.A. Mc Donald, nor has there ever been anyone on our rolls by that name. While we do not care to pronounce judgement on others we will say that a great many of these complaints come from disgruntled persons who have been discharged from the employ of the Company. We are getting a book made for accident reports of any and all kinds and will send you a carbon copy of each and every one. We will ask you to kindly return this report of Pit Committee as soon as convenient. Assuring you we are doing all we can for the welfare of the employees and to keep the law we are

Yours very respectfully

Canadian-American Coal & Coke Co.
Limited,
by

Canadian-American Coal & Coke Co.
Limited,
by

4797

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF PUBLIC WORKS

FILE 4797.

Copies Mr. [illegible] [illegible] Stalks [illegible] company [illegible]

Calgary 21st Dec 04.

Sir, Your favor of Dec 16th received with enclosure from J. A. McDonald Blairmore. Alta. I have carefully perused your communication and also Mr. McDonald's letter. I beg now to submit my remarks thereon. I visited the Frank Mine 2048 on the 12th of this month, going to the Mine at 6.40 A.M., so that I could see all the miners go in. I spent my time round the Mine till 11 A.M. and then went to the office to examine the plans, making arrangements with the Manager and Mine Foreman to go into the Mine at 1 P.M. These arrangements I carried out, went into the face of the main entry and counter gangway, which is in over 7000 feet. At about 3000 feet in I measured the air three times and my accompanying report will shew what I consider the weak points at the

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

Reply to
The Dy. Commissioner
Department of Public Works
Regina

Refer to
FILE 4797

DO NOT WRITE ABOUT MORE THAN
ONE SUBJECT IN ANY LETTER

mine. I enclose a copy of the Owners report for this month which is in accordance with Rule 31 Sec. 9. C.M.R.O. This report seems a little conflicting with Mr. McDonalds letter.

With regard to the accusation against me entering a mine under the influence of intoxicants on that or any other day seems to me to be some personal grievance on some one's part. In my 24 years mining experience I have never entered a mine under these conditions, neither have I ever allowed to my knowledge a workman under me to act otherwise. I leave the matter in your hands if you wish to investigate it or any further explanation from me I will be very pleased to furnish you with, also to ask Mr. McDonald for some proof of his statement.

On my trip in the Crows Nest District

(3)

this last time it was not my intention to visit the place in all the mines, but rather to collect data for my annual report, which I hope to begin on at an early date. By your instructions I leave to-day for the Frank Mine and will report again on my return.

I have made regular reports to you on the condition of this mine and your instructions have been carried out,

Your Obdt. Servant
Frank B. Smith
Inspector of Coal Mines

John Stocks Esq
Deputy Commr }
Regina.

COPY.

Original on File No. 4797.

Blairmore, Alta, December 21st, 1904.

To the Commissioner of Public Works,

Dear Sir,-

Having seen a letter from your Department in regard to the condition of the Frank Mine I must say that this mine is in good condition and the miners committee travelled said mine on the 13th of December and gave in their report on last saturday night at the miners union meeting. The report was first class I has have worked in coal mines in British Columbia and Washington and consider the Frank Mine the safest mine I have worked in.

Yours truly,

(Sgd) J. A. McDonald.

The letter that got to your Department signed. J.A.McDonald. I nothing about.

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

WHEN REPLYING
Do not write about more than one subject in any letter;
And kindly refer to our File Numbers;
And address your envelope to
The Deputy Commissioner
of Public Works,
Regina.

4797
REFER TO FILE

REGINA xxxxxxx Calgary Dec 24 / 04

*Copy.*

Sir,-

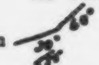
In pursuance of your instructions, I visited No. 48 Mine at Frank this week, and made a thorough examination of it, especially the points brought to your notice by some one signing himself J. A. McDonald, who is not working in the mine.

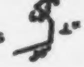
Following the main gangway to the place which is the main intake airway, I measured at a point which is about 3000 feet in, the total quantity of 18600 cubic feet of air passing per minute; this is over 300 cubic feet of air per man per minute, which I consider is quite sufficient.

I examined the counter gangway, inside and outside rooms, also the return airway. In only one or two places was any gas found, and in these instances the reason was the cross cut not being through near enough the face; this condition is usually regulated with battice until the cross-cut is put through. The return airway was free from gas, shewing that very little gas was being made, although the mine was working the usual number of miners at the face. Safety lamps were used when so instructed and even now there are about 25 miners on each shift is given a lamp to examine his place after he has been out of it for dinner or after firing a shot. Under the present conditions of the mine it cannot be said that it is one in which safety lamps shall be used exclusively.

With regard to timbering: this is a question that has called careful consideration by the management and myself for some tis time past. It is an easy matter to timber the main and counter-

counter

counter-gangways, which is done successfully, but the conditions of stratification in this locality has changed so often that the mode of working had to be changed accordingly. For example, when this mine was first opened the coal seam was pitching to the west at an angle of \70°, from that it changed to vertical ⊥ again /60° to the east, and as low as /30° to the east. At the face of some of the breasts now the pitch has changed from 

and in fact when there was a slight faulting it acted thus 

Now taking all these points into consideration, the management decided the safest way to work it would be under the present system, viz., only running the breasts 10 feet wide with 20 foot pillars, and allow the coal to arch, thus saving the men carrying up and placing the timbers. The coal on the 30° degree pitch was always taken away from them, but now when it has changed to 50° – 60° the system has again to be slightly altered. The places t that have come to the steeper pitch have been stopped and the management is now driving places for every ten rooms to act as travelling ways, and also as a self acting incline to take up timber to the rooms for the men to stand on and working the room full of coal, the ventilation passing through the cross-cuts.

To show that there cannot be a great deal of danger attached to the system adopted, there has been no serious accident in the mine during the past twelve months, except in the case of a drivers helper who was killed in the main gangway, jumping

off

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA
DEPARTMENT OF PUBLIC WORKS

WHEN REPLYING
Do not write about more than one subject in any letter;
And kindly refer to our File Numbers;
And address your envelope to The Deputy Commissioner of Public Works, Regina.

REFER TO FILE

REGINA,

off the cars and nearly a mile from the working face.

Your obedient servant,-

( Signed.) Frank B. Smith.-

Inspector of mines.

Jno. Stocks, Esq,-
Deputy Commissioner,-
Regina, Assa.

## Appendix 1.2

Provincial Archives of Alberta
File #77.237/48e

THE CANADIAN-AMERICAN
COAL AND COKE CO., LIMITED

HEAD OFFICE, MINES AND OVENS
FRANK, ALTA.

FRANK, ALTA. July--31th.--07,

we the undersiged Pet Commette assitgke men antes Not savft frome the top side tonell ut, and all so 11½ Shut is not seft, all so we found man dede in Cr of 84 angle and wos 2o feet eas no stopen or Bord to cape/ut from it, no gas repqied in croscot of 84 angele

P., Bakos     Daniel Dunlop     Alois Kark

N.B.

This Report is copied as nearly as it is possible to do from the original Report made out, written and signed by the Pit Committee whose signatures are given above.

Elijah Heathcote
District Inspector of Mines

## Record of Measurements of Crevices on Turtle Mountain.
## beginning June 2nd. 1903.

NO. 1. - 250 feet back from central.

Reference - two trees 20'-6" 1/8 Hang tape on east nail and measure to inside east edge of body of west nail. crevice about 2"

- - - - - - - - - - - - - - - - -

June 2nd. Mounds placed . - found correct.

June 5.
" 9
" 12
" 20
" 24
" 29
July 4
" 8
" 12
" 23
Aug. 7
" 19
" 22
" 28
Sept. 3
" 20
" 23
" 27.

David

D. A. Stewart.

---

NO. 2. - 150 feet back from central peak.

Reference - two cement mounds nails 4½
also two wedges to south.

- - - - - - - - - - - - - -

June 2nd. Mounds placed, Found correct.

June 5
" 9
" 12
" 20
" 24
" 29
July 4
" 8
" 12
" 23
Aug 7
" 19
" 22
" 28
Sept 3
" 20
" 23
" 27

D. A. Stewart.

NO. 3? - 20' back from east face of mountain about 300' north of central peak.

Reference - Split tree - two nails 5" centre of one to edge of other.

also wedges to north of NO. 3.

- - - - - - - - - - - - - -

June 2nd. - Marks placed - Found correct.

June 5
" 9
" 12
" 20
" 24
" 29
July 4
" 8
" 12
" 23
Aug. 7
" 19
" 22
" 28
Sept. 3
" 20
" 23
" 27

D. A. Stewart.

---

NO. 4. -. 40' down from top of north peak on east face.

Reference - Cement mounds inverted nails 3'-8" crevices about 2¼"

- - - - - - - - - - - - - - - -

Mounds placed June 2. Found correct.

June 5
" 9
" 12
" 20
" 24
" 29
July 4
" 8
" 12
" 23
Aug. 7
" 19
" 22
" 28
Sept. 3
" 20
" 23
" 27

D. A. Stewart.

. NO. 5. - 100' down east face north peak.

Reference - cement mounds inverted nails 7½"

Note - Small crevice parallel to 4 and 5 between the two close to 5.

- - - - - - - - - - - - - - -

Mounds placed June 2. found correct.

June 5
" 9
12
20
24
29
July. 4
8
12
23
Aug. 7

(East mound displaced by rains loosened, that is, placed in old wash, measurement correct.) Aug 19.

(Cemented mound again in original position)

Aug 22
28
Sept 3
" 20

Mound displaced.

Sept. 23

Mound replaced

Sept. 27.

D. A. Stewart.

---

NO. 6. - 200' down E. face. N. peak.

Reference - cement mounds inverted nails 10'. Crevice about I

- - - - - - - - - - - - - - - - -

About 8' East of No. 6. thin crevice.

- - - - - - - - - - - - - - - - -

At edge about 60 ft. down from NO. 6 Crevice 4" or 5" wide runs 10' to 40' back from edge.

- - - - - - - - - - - - -

Mounds placed - June 2. - Found correct. -

June 5
9
12
20
24
29
July 4
8

July 12
23
Aug. 7
19
22
28
Sept. 3
20

Sept. 23
27.

S. A. Stewart.

## GENERAL NOTES

June 8. No change observed. Very little wearing away from S peak.

" 9. Considerable wearing in S. peak.

" 14. Little or no change.

July 4. Observed new crevice 100 N. NO 6. 1.2. one not before recorded Has not of course been made since slide.

Observed a very old crevice down N.W. shoulder

" 8. Heavy snow and rain fell since last observation. No change

" 19. Fixed again in place E. mound at NO. 6 which had been dislodged by rain.

" 27. Last trip up W.M. Everything in good shape, no change in crevices since June 2.

D. A. Stewart.

Apr. 25.

Orders from Mgr. Gebo to go up Turtle Mt. and report depth of snow. Found peaks fairly free. Saw several cracks, two trees split by them, all evidently old.

26. Ascended by ridge from lime kiln with Mgr. Gebo. Cracks and marks pointed out and down west ridge. No cracks on snow.

27. Up Kiln ridge. No change visible in cracks. Snow and small stuff slipping from south peak.

28. High S. widd - snow nearly clear from blazed trees but crack there still covered with snow.

E. crack C. Peak shows 44' long-widest 2'.

Next back 35'-9" long N & W crack 21' avge. wide. Marked widest (7") with flat stone, pencilled date.

29. Up west side, extremely cold-snow clouds over top very thick no visible change.

30. Up west and down kiln ridge, no change in cracks - More snow which became sleet at foot. Mgr. said not necessarily to go up tomorrow if wet.

May 2. Snow very heavy going 3" deep in timber, 6" on top, cracks all covered, got very wet.

3rd. Up W. side, snow hard, all covered but 45' one, melting snow running through. Reported to Mgr. who said "All right".

4th. Waited until 10.15 for Magill students, then started, no change.

5th. H. Cummins came and took me with him (7.15) to cruise timber limits E. of Blairmore, Township V11.

6th. Students here Pt. of Roberts. Two went up with me by kiln.ridge, would only stay few minutes on top so got back [illegible]. No change.

7th. Up west, Cold. Snow hard. Snow flurries on top very cold. No changes visible.

9. Collins with me up Kiln ridge, watched dust from S. pk. heard rumbling but could see no rocks going. C. agrees only danger is from centre Pk. No visible change in cracks.

10. Snow flurries cold with wind. Dust going under C. P. [illegible] Cracks unchanged.

11. Heavy snow last night. Got ~~xxx~~ very wet. extremely heavy going. Snow melting on top under hot sun. All cracks covered.

12. Up west side. Snow soft and wet. melting on top.

13. Up west side. was wet. long search for cement mounds, none seen, No change.

14. Boulder about 1/2 ton weight gone from under C. Peak. No other change.

15. Sunday. Saw Fraser at Sanitarium re article for Montreal Star re Mt. Did not show any credentials and argued N. Pk unsafe, so referred him to Mgr.

16. Snow going fast but cracks not clear yet.

17. Former situation unchanged.

18. Rain. Got soaked through. No changes visible.

19. Rain, heavy on top very thick unable to see anything.

20. Bright sun strong ½ NO. 1 now visible. no change. S. Pk rumbling loudly.

21. Met. McFarlane a prospector on top and discussed cracks. He claims split trees were there two years ago. Reported same at office. 3*

22. Sunday. Rubble from under S. pk.

23. Started 7.15 very slippery twisted right knee and went back. Not counted a trip.

24. Laid up. Snow and rain.

25. Hard snow at back. good footing, no change.

26. No change in cracks. Reported movement in S. peak.

27. Watched S. peak from E. through glasses. ~~and~~ two hours. then up W. side. No change.

28. All new snow gone from top except C. pk. Marked stone moved by someone no change visible. Watched S. Pk. carefully through glasses from top . yellow dust apparently going through from back. Large rocks must come away soon if this continued.

29. No move S.P. until 9.45 then slight. Heard loud rumbling when near top but could not tell ~~where~~ ~~there~~ when there where it came from

30. Went under S pk. early large quantity of round edged blue stone hanging loose. must come soon. No change in numbered cracks.

31. Rain. Spk rumbling all night. Heavy cloud on top everything got very wet. Could hear rumbling from S. pk. but could see nothing. See map re [illegible] N. crack.

June 1st.

Havey mist S. Pk. noisy all water from snow running through back crack. C. pk. showing clear outlet at E. face. This wants watching. All centre peaks clear to last years measurements. Can't see from F. what is coming through under C. pk. a/c thick weather.

2nd. 50' of back crack C. pk. now clear N. end in snow E. & W. crack (unnumbered)clear 250' W. end in snow. If this and back one melt, top stratum of C. pk. must be isolated ready to fall if strata under went away. Small stones still going from under C. pk. Viewed from N. pk. it now looks merely a question of time when top stratum of centre pk must slide off. It can then be seen better if N. pk. now apparently safe, has any weakness.

3rd. Reported to Mgr. all above wrote and signed report. Up N. side no changes visible.

4th. New snow on top 250' E. & W. crack covered to 50' of edge so could get no new information. Told to stop going up Turtle Mountain by Mgr. Gebo.

13048.

fb May 13th, 1908.

Memo. for Mr. Stocks,-

With reference to our conversation on the change of management at the Frank Mine, I beg to submit the following:-

Mr. Gebo, who was Manager of the Frank Mine at the time of the slide, has now returned and again holds the position of General Manager with the Canadian American Coal & Coke Co. at Frank. During Mr. Gebo's previous regime at Frank it was currently rumored, and probably with a good deal of truth, that his main object was to boost the output up so he could dispose of stock in the mine. To do this he was compelled to draw a great number of pillars and curtail his development work. Some of these pillars ought not to have been drawn until a much later period, as they were situated in such a position that when they were taken out the pressure was thrown on to some of their main roads and these main roads have been giving them trouble ever since. It was also suggested at the time that the withdrawal of these pillars had some connection with the slide.

Again the rumor is afloat that Mr. Gebo intends to pursue his old tactics as regards boosting the output and curtailing expenses. Mr. Heathcote is fully alive to the conditions prevailing in the Frank Mine and I discussed the matter with him when on my recent visit to Frank in connection with the examination. He said that he would pay particular attention

attention to the inspection of this mine and look out for any danger. Of course, we cannot stop Mr. Gebo from drawing pillars unless such action would imperil the safety of the persons working in the mine. The drawing of these pillars will probably not affect the safety of the mine so much as the life of the mining operations and the economy of the mining operations in years to come.

It is also reported that Mr. Gebo intends to work the "slope" situated on the west side of the town of Frank. This slope has been idle ever since Mr. Gebo left some years ago. He now intends to pump out the water and work the slope. The vein of coal runs underneath the town to the east and by working the coal on this side there will probably be considerable damage to property. However, to guard against this does not lie within our province so far as I can see. If the coal is worked to the west side the mine will cross underneath the creek, and the management which has just retired did not deem it advisable to take out this coal in case they should get an inflow of water. If they should tap the creek with the workings I do not think the inrush would be fatal as regards the people employed in the mine as the water would come in fairly slowly.

The portion of coal to be worked is just at the base of the mountain peak which is still standing. Behind this mountain peak are several cracks such as were behind the peak that came down. I am not in a position to say whether this working will have any tendency to widen these cracks or

cause

page 3 missing (MB). [illegible]

cause another rock slide, but it certainly is a question which we must keep in view should these workings be started and developed to any great extent.

Your obedient servant,

Provincial Inspector of Mines.

GEOLOGICAL SURVEY
R.W.BROCK, Director.

DEPARTMENT OF MINES
CANADA

Ottawa, March 15th, 1909.

Dear Sir,

My attention has been called to the fact that a French Company operating at Frank has started "coal mining operations in the ground between the shaft and the slide." I presume this refers to the ground between the shaft and tunnel of the old Canadian-American Coal and Coke Co. If this is so it is a question whether these operations are safe. If the upper shoulder of Turtle Mountain comes down it will certainly wipe out the town and might completely block the Pass. Not knowing the nature of the proposed operations I am not prepared to express an opinion as to whether the work is dangerous or not, but should you desire it I might be able to offer an opinion if you furnished me with particulars as to what is to be done, and where the work is to be located, or later on when the snow is off I might have an examination made to determine if possible whether it is safe to touch this ground.

Very respectfully,

R. W. Brock

The Hon. W. H. Cushing,
Minister of Public Works,
Edmonton, Alta.

## Appendix 1.3

Provincial Archives of Alberta
File #77.237/48g

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

WHEN REPLYING
[illegible]
THE DEPUTY MINISTER
OF PUBLIC WORKS,
EDMONTON.

REFER TO FILE 13048

JB-NF

EDMONTON Feb. 25, 1909.

Sir,-

The Canadian American Coal and Coke Co., Frank, are, according to the District Inspector's report, commencing mining operations west of their present tunnel. These operations consist of driving a rock tunnel for prospecting purposes and also opening up and developing the old shaft which was sunk a number of years ago. As this work is in the vicinity of the mountain peak which rises abruptly behind the town of Frank, and is adjacent to the peak which fell, causing such destruction a number of years ago, I think we ought to have an expert geological report on the structure of the mountain at this point, and also some information from a recognized geological expert as to whether mining at the base of the mountain will have an effect on the overlying mountain masses.

This matter is hardly one which can be dealt with authoritatively by mining men alone.

Your obedient servant,

Norman Fraser.

Provincial Inspector of Mines.

Jno. Stocks, Esq.,
Deputy Minister,
Buildings.

13048.

Fb March 25th, 1909.

Sir,-

With further reference to our letter of March 20th re the mining operations of the Canadian American Coal & Coke Co., at Frank, under Turtle Mountain, we would urge that you send a man to look into the state of the overhanging portion of Turtle Mountain at your very earliest convenience.

There is considerable talk of danger amongst the inhabitants in the district owing to the new mining operations of the French Company. We have not yet obtained the particulars which we wrote about in our letter of March 20th, but our Mine Inspector informs us that the work being done on the west side of the town is on a very small scale and practically no fresh ground has been broken so far. The new tunnel which is being driven at the base of Turtle Mountain between the old entrance to the mine and the town is only a prospect tunnel and so far no coal mining has been done from it. Although we do not think that the mining operations which are being started there will have any effect on the mountain, at least for some considerable time, should any rock slide take place now it would surely be blamed on the mining operations and reflection would no doubt be cast on the Provincial and Federal Governments. In view of this we would again urge that you send a man to make a

thorough

R. W. Brock, Esq.,
Director, Geological Survey,
Ottawa, Ont.

thorough examination of the condition of Turtle Mountain.

Your obedient servant,

Deputy Minister.

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

REFER TO FILE 13048.

29083

~~EDMONTON~~
Calgary, April 5th. 1909.

Sir,-

In reply to your letters of March 20th. and 26th. file 13048, re plan of the American Coal & Coke Co's prospective workings, at and near the base of Turtle mountain, may say that I have taken this matter up with the Company, and am informed that they have decided to make a complete new survey and plan of their property showing the mine workings, the base and top of the mountain, and all important surface features, but they state that new survey and plan will not be completed until the month of August. I think we should give the Company time to make a complete and reliable plan and survey of their property, and get one that can be relied upon in the future. I do not think that the present operations will have any effect on the mountain, but it would be well to have an expert Geologist make an examination of the condition of the mountain, and we could obtain plan showing progress of the work in the future. However, if you should require a plan, such as can be prepared in a few days to forward to Mr. R. W. Brock, on which for him to base an opinion, I will again take the matter up with the Coal Company and have such a plan prepared, but I think they should make a thorough examination of existing conditions and they will then be in position to advise us from the plans submitted to them in the future.

Your obedient servant,

R. Livingstone
DISTRICT INSPECTOR OF MINES.

John Stocks, Esq.,
Deputy Minister of Public Works,
Edmonton, Alta.

APR 1909

fb

April 8th, 1909.

Sir,-

I beg to acknowledge receipt of your letter of April 1st, re the mining operations in vicinity of Turtle Mountain, and note that you intend to have Turtle Mountain examined this summer. We note that it is your opinion that it is dangerous to have any work done between the mouth of the old tunnel and the point which you indicate on the map you sent us, and that the Company should be prohibited from doing any. On looking over our Coal Mines Act, there is nothing therein giving us authority to prohibit mining operations being undertaken at any point on the French Company's property, so long as all the precautions required by the Coal Mines Act are taken.

We note your suggestion that it would be a good thing to have someone at Frank occasionally ascend the mountain and see if cracks are developing in it. We think, however, that this work ought to be undertaken by the Dominion Government, who own the minerals and collect all revenue therefrom. We do not think, therefore, that the Federal Government ought to shift, either directly or indirectly, any part of the responsibility of looking into the safety of Turtle Mountain on to the shoulders of the Provincial

R. W. Brock, Esq.,
Director Geological Survey,
Ottawa, Ont.

Provincial Government, but we are always ready to cooperate and render any assistance which we can.

For your information I am enclosing herewith a copy of report received from District Inspector Livingstone re the proposed workings of the French Company.

Your obedient servant,

Deputy Minister.

X

3695

GEOLOGICAL SURVEY
R.W.BROCK, Director.

DEPARTMENT OF MINES
CANADA

Ottawa, April 16th, 1909.

Dear Sir,

I have to thank you for your kind favour of the 8th inst., re mining operations in the vicinity of Turtle Mt., and the enclosure of letter from the District Inspector of Mines. I am sorry if my diffidence in taking up the matter, which might be considered by the Provincial authorities to come under their jurisdiction, should be construed as an effort on the part of the Dominion Government to shift either directly or indirectly any part of its responsibility. When Turtle Mt., was examined at the time of the slide it was the view of the Territorial authorities and of their mining expert that all matters relating to the personal safety of the inhabitants of the mining town came under their jurisdiction, and we simply provided them with our opinion based upon our geological examination of the conditions. As however it is now the view of the Government of Alberta that the Dominion should look after this I shall be pleased to take up this matter with the Dominion officials. As the Company is not doing any work in the dangerous ground I suppose that immediate action is not necessary. I shall

be

GEOLOGICAL SURVEY
R. W. BROCK, DIRECTOR.

DEPARTMENT OF MINES
CANADA.

Ottawa, April 16th, 1909.

be very much obliged to receive the complete plan of the coal property and the present and proposed work, which will of course enable one to form a very much more intelligent opinion. There is no question however regarding the unstable condition of the west shoulder of the mountain. This was seen during our examination immediately after the slide and its condition will certainly not have improved since then.

Yours truly,

R. W. Brock

John Stocks Esq.,
Deputy Minister of Public Works,
Edmonton, Alta.

13018

GEOLOGICAL SURVEY
R. W. BROCK, Director.

DEPARTMENT OF MINES
CANADA.

Ottawa, March 26th., 1910.

GOVERNMENT OF CANADA
MAR 31 10

Sir,

Replying to your letter of March 2nd., I have looked over the plans of the Canadian Coal Consolidated Co. of Frank.

It is my firm conviction that it is unsafe to remove the coal from either the shaft or the great seams, anywhere near the base of the North peak and shoulder, say from the pencil marks on the enclosed sketch to the limit of the seams shown on the sketch. These things are so nicely adjusted in nature that the slightest disturbance is apt to bring down a landslide. A readjustment of an eighth of an inch due to the removal of the coal might do it. In this connection it is important to note that most of the destructive landslides have occurred where men were trifling with the base of the block; in the case of the Elm slide it was a seemingly insignificant notch made by a quarry, nothing like as serious as the removal of a seam of coal.

That the former slide was caused by the mining of the coal there is no doubt in my mind. It is true the mine was only one of a number of causes, but if it or any other of

the

the causes had been absent, I do not believe the slide would have occurred. It is of course possible that an earthquake shock might some day have brought Tuttle mountain down, but it is scarcely likely that it would have had the same dimensions. ( See page I3 Report on the Great Landslide at Frank, Alta.) In this report I did not state my conviction on this point in black and white, although it is to be inferred, because the Company might have been held liable for the damage done which would have been unfair, as they had no means of knowing that their work was endangering the stability of the mountain, but if the Company now proceeds to mine the coal under the Northwest peak, they will certainly be responsible for damage to life and property that may result from a slide following their work. If that mine belonged to me I certainly would decline to take the risk by mining where I have indicated. The coal is not worth it.

I enclose an extract from the Summary Report I909 on the present condition of Turtle Mountain. From the sketch you will note the fractures. The jointing of the rock is parallel to these fractures and along any of these joints the

north

north peak or shoulder may break away. Similar joints controlled the other slide. The Northwest joints dip at an angle which brings the lower end out on the face of the mountain below the cliff face, leaving the peak material as an inverted triangle ( see blue lines on diagram I. Report on Landslide) Mining a considerable distance south of the lake is apt to cause a break along one of the northeast joint planes thereby cutting away their only support ( i.e. the North ridge). If they break away the material will run down towards the town, as that is the steepest and shortest route to the valley. If this sketch were more accurate this point would be more easily recognized.

There is no way that I can see of accurately determining how close to the base of the shoulder it is safe to mine, but it is certain that a broad base of coal should be left and that it should extend farther south than north of the point where the axis of the shoulder would meet the seam. (Dotted in sketch map.)

Your obedient servant,

R W Brock

John Stocks, Esq.,
Deputy Minister of Public Works,
Edmonton, Alta.

GEOLOGICAL SURVEY
R.W.BROCK, DIRECTOR.

DEPARTMENT OF MINES
CANADA.

DEPARTMENT OF PUBLIC
MAY 18 1910

13021-8

Ottawa, May 12th., 1910.

Sir,

Replying to your letter of April 27th., I have indicated on the sketches more clearly than before what in my opinion constitutes the danger zone, in reference to mining the coal. I have submitted it to several of the geologists of the Survey and with me none of them think it would be at all safe to mine south of the point I have indicated as the northern limit of the danger zone. It is questionable if coal should be mined below the entry level anywhere under the former slide, as it would be practically certain to bring down a large slice of the south peak, the jar of which might start the north peak and shoulder. Unquestionably no coal should be mined between the northern limit of the danger zone and a point beyond the seams as represented on the Blue print sketch map. This sketch map represents the peak as in last October.

I have spoken to the Interior Department about the title to the coal lands. This has passed into the hands of the Company and they have no hold on the Company and no power to interfere in any way or they would certainly act. I am writing the Justice Department to ascertain what department, if any, of the Federal Government can act.

Last Spring I inquired of the Department of Justice whether the Dominion or the Provincial government had jurisdiction in a matter of this kind and it expressed the opinion that the Provincial government was

unquestionably

unquestionably competent to act if operations were a menace to public safety. There can be no question as to the authority of the mine inspector to prohibit the work. I have some doubts, however, about any department of the Federal Government having power to interfere, at least directly.

There might be a Department that could take legal action to restrain the Company but that is not a satisfactory method. It is slow, costly and uncertain. Uncertain because it is always possible to get witnessesthat will pass for experts, to uphold any view. We have just had a sad example of this here. A couple of years ago Hull city tried to secure the removal of the plant of the General Explosives Co., as a menace to the safety of the citizens of Hull. The Company was able to satisfy the Court that there was absolutely no danger. Last Sunday the whole works exploded and the carnage was frightful, many being killed and scores injured while in their homes. This shows the extent to which Courts or corporations may be entrusted with the safety of the public. What is necessary in such cases , is action by some authority that can directly prohibit the dangerous proceeding.

On hearing from the Justice Department I shall let you know whether in addition to the Alberta government any department of the Federal Government has power to take such action.

I have the honour to be,
Sir,
Your obedient servant,
R.W.Brock

John Stocks, Esq.,
Deputy Minister of Public Works,
Edmonton, Alta.

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

[illegible]

REFER TO FILE 13048.

xb EDMONTON, May 30th, 1910.

Memo. for Mr. Stocks,-

Re Mining Operations at the Base of Turtle Mountain, by the Canadian Coal Consolidated, Ltd., Frank.

It appears now that the Federal Government does not intend to interfere in this matter, and while Mr. Brock, Geologist for the Federal Government, states conclusively that another slide is practically certain if coal is mined anywhere under the former slide, he says the Department of Justice at Ottawa has expressed the opinion that the Provincial Government was unquestionably competent to act, if the operations were a menace to public safety. He also states that there can be no question as to the authority of the Mine Inspector to prohibit the work.

My opinion is that until such time as we consider that the lives of any of the employees at the mine are endangered, the Inspector of Mines has no authority under the Coal Mines Act to interfere. As a matter of fact, if there is any danger of another slide occurring, then the lives of the employees at the mine are being endangered, and under Section 48 of the Coal Mines Act the Inspector of Mines has power to stop any operations which are likely to endanger the lives of these men.

As stated in our letter to Mr. Brock of the 27th ult., we have no doubt the Federal Government has power

power to prohibit the Company from carrying on operations which are likely to prove a menace to public safety, but this question is still undecided, as Mr. Brock states in his letter of the 12th inst., that he is taking the matter up with the Department of Justice to ascertain what Department, if any, of the Federal Government can act, and that he will advise us as soon as he hears from the Department of Justice.

As the Canadian Coal Consolidated, Ltd., are depending to a great extent for their future output on the area which Mr. Brock considers comprises the danger zone, and are pushing ahead development work in this area and erecting expensive machinery for this purpose, I would suggest that immediate steps be taken to prevent them from doing any further work in this area. They have gone to a considerable expense recently, both in development work and plant, for the purpose of working this coal, and are contemplating a still further outlay, and it will doubtless save considerable trouble in the future if they are informed at once what is to be done, so they will be able to avoid still further unnecessary expense in this direction.

I may here say Mr. Brock has altered what he considers the area comprising the danger zone on three different occasions since this question was first taken up with him, and we are now accepting his last sketch, with the danger zone shown on, as correct. On the accompanying blue print, which was supplied to us by the Canadian Coal Consolidated, Ltd., I have marked the first danger zone

decided

decided upon by Mr. Brock in April, 1909, in red: the second, on March 28th, 1910, in blue; and the third one, which we are now accepting as being correct, in green.

In Mr. Brock's last letter, dated May 12th, he says it is questionable if coal should be mined below the entry level anywhere under the former slide, as it would be practically certain to bring down a large slice of the south peak, the jar of which might start the north peak and shoulder. He also says that unquestionably no coal should be mined within the area which we have shown on the accompanying blue print, and as the Company are now mining coal within this area, some action should undoubtedly be taken by either the Dominion or Provincial Government without delay.

Respectfully submitted,

John T. Stirling,

Provincial Inspector of Mines.

13048.

For the Provincial Inspector of Mines

June 27th, 1910.

Sir,-

On Friday June 24th, I made an inspection of the Shaft Mine workings of the Canadian Coal Consolidated Co. Ltd., at Frank and I consider that the present system of mining coal will in the near future endanger the whole of the mine.

The system of mining consists in driving the gangways leaving a pillar of 11 feet above the gangway. Breasts are worked advancing parallel to the gangway. Above the breasts 11 feet of a pillar is left and breasts advancing parallel with the gangway leaving 15 feet of pillar to support the 240 feet level. It has been shown to me that the 11 feet pillar left between the two breasts is not there now, having fallen out of its own accord in the south side gangway and most of it if not all extracted in the north side gangway. This being so there are two pillars left, one of 11 feet above the main gangway to support it, and one of 15 feet below the 240 feet level to support it, leaving a space of 84 feet between the two pillars, the hanging wall and foot wall being supported with 6" or 8" round timber put in from wall to wall extracting 3/5ths of the coal, leaving 2/5ths to support the mine and is to apply the longwall method of working coal on a pitching seam without any packing being put in. The pillars which are left will not stand any crushing strain, the coal being too soft and friable. The timbers will stand a certain amount of crushing strain and when the rises begin to move will break and the whole mine will collapse.

I must insist that a different method of working be adopted. If you persist in working the coal on the present system, then the empty spaces must be securely packed with rock.

On Friday, June 24th, Mr. J. T. Stirling, Provincial Inspector of Mines, with myself and your mine Manager, Mr. Jos. Emmerson, in the office of the Coal Consolidated Co. discussed the method of mining coal in the Shaft mine and Mr. Emmerson agrees with us that the present system is not a safe one and this system of mining coal is not his own.

Therefore you will have to adopt a defferent and safer method or fill in the empty spaces with rock under the present system.

When the sides of the vein begin to move, it will cause the water to enter the mine in a larger volume. From the footwall of the vein to the river is a glacial deposit full of water. Any movement of the walls of the vein will cause this water to flood the mine.

Your obedient servant,

Elijah Heathcote

Dist. Inspector of Mines.

A. L. Muller, Esq.
General Manager,
Canadian Coal Consolidated Co. Ltd.
Frank, Alberta.

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

[illegible]

REFER TO FILE 13048.

xb EDMONTON, June 30th, 1910.

Enforce safe
sy. now
while damage small
ALS

Memo. for Mr. Stocks,-

On the 24th inst., along with Mr. Heathcote, District Inspector of Mines, I met Mr. Emmerson, Manager of Mine No. 48, operated by the Canadian Coal Consolidated, Ltd., at Frank, and discussed with him the system of working which has been adopted in the shaft mine operated by this Company. Since the water was pumped out of the mine in the early part of last year, I have repeatedly expressed to the management that I did not approve of the system of working which they had adopted in this mine.

The coal seam is 8 feet thick and is pitching at an angle of 86½°, with good hanging wall and foot wall. The system of working adopted is as follows: the gangway is driven 9 feet high and a pillar 11 feet thick left above it. No. 1 Breast, which is immediately above this pillar is 20 feet high and driven parallel to the main gangway. Above this breast another pillar 15 feet thick is left in and a 20 foot breast worked above it again, and so on.

I take exception to the system adopted principally on the ground that too much coal is being extracted and not sufficient being left in to support the strata. The management, however, have always expressed the opinion that the pillars were quite sufficient. Whether they believe this or not, I am not prepared to say. At the interview I had with Emmerson on the 24th inst., I learned that some of the pillars the pillars above the first breast have been extracted and that others had fallen out owing to the very soft and friable nature of the coal. This leaves a space of 55 feet above the gangway pillar without anything except props to support it. The pillars above this breast will also behave in the same manner as those that have already fallen out, so that it is to be expected that a very much greater distance than 55 feet above the gangway will be left vacant within a very few months. Some time ago I asked Mr. Muller, General Manager, how he proposed to keep these props in repair, and he informed me that he would have them examined once every week and have any defective props replaced. Now it is impossible for this to be done, as a man would be running a great risk if he were to climb over these timbers, and the consequence is that when the timbers decay there is nothing whatever left to support the walls. The result will be that the walls will break and when they do so the workings will cave, and any persons who are working inside will be entombed. As a matter of fact, I do not believe all the props they can put in would prevent this from happening. As the greatest part of the output will come from inside where this cave is likely to take place, this might mean a serious catastrophe. The management will probably reply to this argument that they will keep escape shafts inside the workings to allow the workmen to get out. This might minimize the danger, but it would not prevent it, as probably these shafts or some of them at least would also be wrecked.

Another danger to be apprehended is from an inrush an inrush of water from the surface or from the river. There is probably only about 100 to 110 feet of stratified rock on either side of the coal seam, and between this rock and the river there is undoubtedly alluvial deposit which will be lying full of water. How far this alluvial deposit goes down, it is impossible to say. If the stratified rock breaks there is nothing to prevent the water rushing in and filling up the mine. It is a matter of opinion, however, whether it would rush in at such a rate as to prevent the men from escaping before the workings filled up. The chances are about even whether it would do this or not. At Coleman the water broke through a few years ago from the alluvial deposit and drowned out the workings, but fortunately it happened at night when there were no persons in the mine, otherwise the consequences might have been serious.

I have discussed this question with different mining men in the Province, and they all agree with me that this system should be condemned as being unsafe. Other systems can be adopted for working this coal, which, though they may not be so satisfactory from a money-making point of view, would certainly be more satisfactory as far as safety is concerned. Mr. Emmerson, the Mine Manager, also informed me that he disapproved of the system, but asked me not to say so as the Company would not like it. I told him, however, that I could not comply with his request, as the safety of the lives of the employees had to be considered before either his position or the question of profits.

From the attached copy of letter which Mr. Heathcote has sent to Mr. Muller, General Manager of the

Company,

Company, you will see that he also agrees with my opinion. You will also note from this letter that Mr. Heathcote has notified the Company that they will have to adopt a different and safer method of mining. Before taking any definite stand in this matter, I desire to submit to you my views on the subject for your approval.

I may say that the workings referred to are chiefly on the north side of the shaft, and therefore will not be affected in any way by the question of Turtle Mountain which is now under consideration.

Some time ago at my request the Canadian Coal Consolidated Ltd., forwarded to this office a plan of their proposed method of working, and it was only when I interviewed Emmerson on the 24th inst., that I learned that these plans were not being carried out and that the pillars referred to above were being extracted.

I wish to make it clear that even if these pillars were not extracted, or had not fallen out, I do not consider it a safe method to work this coal, and that immediate steps should be taken to have it prohibited.

Respectfully submitted,

John T. Stirling,

Provincial Inspector of Mines.

## Canadian Pacific Railway Company's Telegraph

TERMS AND CONDITIONS

All messages are received by this Company for transmission, subject to the terms and conditions printed on their Blank Form No. 2, which terms and conditions have been agreed to by the sender of the following message. This is an unrepeated message, and is delivered by request of the sender under these conditions.

JAS. KENT, Manager Telegraphs, Montreal.

OR 100 KR MC 106 Paid 5 extra 17k

139

Lethbridge, Alta July 22-10

Hon. Arthur Sifton, Premier Edmonton, Alta.
Mines closed down at Frank owing to mine inspector stirlings letter twenty first instant and will remain closed unless satisfactory arrangement made. Do not understand that present system is wrong in any particular, nor has stirling notified he want change is necessary. Meantime one and one half million dollars foreign capital at stake. The system in use is the modified french standard and is specially arranged to guard against accident and loss of life. Would request the appointment of competent investigating committee to pass upon different points now open so mines can be started again without loss of time answer here.

Felix Colemer, Consulting Engineer Canadian Coal Consul.

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## Canadian Pacific Railway Company's Telegraph

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JAS. KENT, Manager Telegraphs, Montreal.

891

151 sr ra 39 collect -lettergram-

Frank, Alta., July 21st., 1910.

13078

John Stocks,

Deputy Minister Public Works,

Edmonton, Alta.

In accordance with instructions received over the telephone from Minister of Public Works I have notified the company at Frank that system of working in shaft is to be changed immediately. Expect to arrive in Edmonton Saturday morning.

John T. Stirling.

126k, 22-

Shaft Mine

## NOTES RE FRANK MINE.

In April, 1909, the Company were notified to send plan of workings, which they did not do until Feb. of this year.

My report to Department of July 29-09:- "The workings are commenced away at a point 250 feet from the winding shaft on the one side and 230 feet on the other". From the plan we received recently, the workings are shown to have been commenced about 80 ft. from the shaft on the north side and 115 feet from the shaft on the south side.

June 30th, 1909, my letter to Mr. Stocks:- "The method of shot-lighting has been taken up repeatedly with this company both by Mr. Livingstone and myself, and it appears to be difficult to get them to understand the necessity of complying with the Coal Mines Act".

Nov. 22-1909. I notified the Company that they were committing between 12 and 15 contraventions of the Coal Mines Act.

No plan of shaft workings kept Nov. 20, 1909. as required by Coal Mines Act, and it was necessary for us to have such a plan before we could properly figure out the system of working. Plan of the old mine was received in January of this year.

My report Jan.28,1910. states:- "The gangway on the south side has been abandoned as an inrush of water has been encountered. A dam is being built of brick work across the gangway." I understand from Mr. Heathcote now that this gangway has been recommenced.

Letter from Livingstone to me, Feb.1, 1910:- "This would look as though their plan of proposed method of working has received very little consideration, at least it seems to be very wide of the mark, and I think this mode of working shows defects in other particulars."

When I discussed with Muller, about Feb. 1910, the system of working the shaft, I had occasion to refer to the Coal Mines Act, and Muller told me:- "I would not spit on your Coal Mines Act".

We were notified by the management on 9th July, 1910, that they had located the North Peak of Turtle Mountain about 1500 feet further north than shown on Brock's plan. In acknowledging this letter I suggested to them that they should inform Brock of this. I believe they have not done so. If they are correct, it means that the north peak is 1500 feet nearer the shaft workings than what Mr. Brock thought it was, consequently the shaft would be brought into what we understand he considers the danger zone.

Notified June 27th, 1910, by Heathcote, as follows:- "Therefore you will have to adopt a different and safer method".

In Company's letter to Minister of July 7th they say that about 25% of the coal is being extracted and 75% remains to sustain the shaft levels and roadways. This is nothing more or less than a deliberate attempt to mislead the Minister, as I proved to their satisfaction on Thursday last that there was 28% of coal being left in and 72% being extracted. The way they arrived at the 75% being left in was that they calculated this percentage from an area which contains a barrier that has to be left below the C. P. Ry.

On 21st inst., I notified the Company to change system of mining in their shaft mine, and was surprised to hear in the hotel next morning that they had suspended operations in both the shaft mine and the old mine. I take the position that I did not close down their mine. At the same time, if I had closed down the shaft mine I would have felt quite justified in doing so. As the question of working has nothing whatever to do with the old mine, and about 50% of their output is coming from this mine, it gives me the impression that there must be some other meaning for the step they have taken - possibly something in connection with the stock market.

I understand that two of the previous managers at this mine resigned their positions rather than be responsible for the present system of working in the shaft mine, and the present manager (Emmerson) has repeatedly told me that if he gave his true opinion of it he would be discharged.

The company have for some time been very sore at the Department, because we have had to write very strongly to them to get them to comply with the different sections of the Coal Mines Act.

Last year there were five fatal accidents in the bituminous and anthracite mines in the country, and three of these happened in the Frank Mine. While this has nothing to do with the system of working, it certainly reflects on the management, and it was only after considerable pressure on the part of the Department that the dangers which caused those accidents were removed.

We did not act before under Section 48 as we considered the mine had only now become dangerous, some of the pillars having been extracted and some cropping out.

Mr. Livingstone told Co. in August, 1909, that he considered the method would be unsafe when more coal was extracted and told them if they continued to spend money on it now and had to alter it later on they would have to blame themselves. I have told them practically the same thing repeatedly.

From the Summary Report 1909.

## TURTLE MOUNTAIN.

On the return journey to Ottawa a stop for a day was made at Frank, Alta., to examine Turtle Mountain, especially the North shoulder above the town. The summit now presents a more dilapidated appearance than immediately after the great landslide. The breaking away of material back to the limits of the cracks formed at the time of the slide, leaves a more gaping hole with the north shoulder outstanding. A large amount of material has still to come from the South peak which is traversed by two major crevasses some distance back from the face of the cliff. This peak is so situated that falls from it are not likely to cause damage. On the North peak overlooking the town a break is not impossible, especially if artificial excavations are made near its base. A rather fresh looking crack extends across the ridge and down the west slope between the summit of the North peak and the shoulder overlooking the town. Two cracks parallel to the face of the ridge occur on this shoulder between the main ridge and the edge of the cliff.

While on this shoulder there is little or no evidence of movement, and it still presents an appearance of solidity, it must not be forgotten that it is standing out without support except at the west end and that its cliff face is high and steep. The same causes which brought about the former catastrophe, might produce a similar effect upon this shoulder of the mountain. If a large mass were detached from it, it would certainly reach the valley bottom and there is nothing, as there was in the former slide, to prevent its spreading fanlike down the slope and over the valley bottom.

Jts-N.

Edmonton, July 12th. 1911.

Dear Sir,-

I notice in the local newspapers recently that an extract from your report on Turtle Mountain has been published, and which naturally seems to have caused a considerable amount of consternation.

I am very pleased that this step has been taken as it has been the means of warning the people as to the danger which exists owing to the condition of the mountain. I enclose a cutting taken from the issue of the Edmonton Journal for July 10th. 1911. and as perhaps you have not seen it, I thought it might interest you.

You will note that the Coal Company are of the opinion that " the danger which is said to be overhanging Frank " is absolutely unfounded," while I am almost certain that neither Mr. Mueller or Mr. Colemer have been on the top of the mountain to investigate if this is so.

If you have made any further report than the one which you forwarded to this Department last Fall. I would be pleased if you would kindly let us have a copy of it.

I have asked the Company to forward to me a blue print showing the workings up to date. a copy of which will be forwarded to you for your information as soon as we receive it.

In a statement made by the mine superintendent and which was published by a few of the local papers, he stated that the Company had not been mining for a number of months at the base of the mountain. This I believe is is correct, the explanation being however, that all the mining operations in the Crow's Nest Pass have been suspended for the last three months owing to the strike of the miners.

As I am no doubt you are aware, the Canadian Coal Consolidated Ltd. were, up to the time of the strike, carrying on mining operations within what you consider the "danger zone".

I will be pleased to hear from you at your earliest convenience.

Your obedient servant,

Provincial Inspector of Mines.

R. W. Brock, Esq.,
Department of Mines,
Ottawa,
ONT.

# Appendix 1.4

Provincial Archives of Alberta
File #77.237/48f

GEOLOGICAL SURVEY
R.W.BROCK, DIRECTOR.

DEPARTMENT OF MINES
CANADA.

13048

Ottawa, Nov. 3rd, /10.

Sir,

On Oct.12th I visited Frank and inspected Turtle Mountain. I was accompanied by Mr. W. H. Boyd of the Geological Survey who examined the mountain with me last year as well as on some previous occasions. Mr. John F. Stirling, Provincial Inspector of Mines, and three representatives of the Coal Company also ascended the mountain, which afforded us an opportunity to point out on the ground some of the facts on which we base our opinion that any tampering with the coal seams in the vicinity of Turtle Mountain is a menace not only to the lives of employees of the Company but to the lives of the citizens of Frank.

Turtle Mountain is in a more threatening condition now than last year. This opinion is concurred in by Mr. Boyd. The north shoulder is of course the dangerous portion of the mountain. After the slide it was carefully examined and it has been closely watched since then, but until last year I saw no signs of movement or, apart from its structure, of weakness on this north shoulder. Last year I detected two cracks as shown on the sketch map which I sent you last spring. They

were

GEOLOGICAL SURVEY
R.W.BROCK, DIRECTOR.

DEPARTMENT OF MINES
CANADA

Ottawa, Nov.3rd, /10.

They were so slight however that it would not have surprised me if their existence had been questioned. This year however they were very marked. The cracks between this shoulder and the north peak also show development during the year. These cracks are significant as indicating movement and unstable conditions. It is true that in some cases the block severed by the crack is not large enough in itself to cause much damage if dislodged, but as the joint planes along which the cracks develop dip towards the face of the cliff, giving the block the form of an inverted wedge, only those near the face can open, the weight of a large block tending to keep the break closed. As the top surface is covered with shingle only a gaping crack makes itself visible on the surface, hence a dangerous break back from the face, the break along which an enormous slide might take place, might not be detectable on the surface even at the time the slide was about to occur.

The cracks on the north shoulder prove that its solidity is not to be relied on. and the recent movements indicated by these cracks may very well be ascribed to the disturbing effect of mining that has recently been done in the neighbourhood of the

Ottawa, Nov. 3rd, /10.

the foundations of this shoulder.

In the face of such facts I cannot evade the conclusion that mining is too dangerous to be continued. It is my firm opinion that no more liberties can safely be taken with this mountain but that these should be stopped at once. There is no place where this coal is so badly needed or worth so much as just where it is in the ground. The district can now produce without one ton from these seams more coal than there is a demand for, so that there is no valid excuse for touching these seams. I do not see how, having regard to the present condition of Turtle Mountain, the mining of these seams can be continued without those responsible for it being open to the charge of displaying a wanton disregard for human life, and should a slide occur it is practically certain that they would be held accountable by the Courts for all havoc wrought.

A large slide would cut off all railway communication and close the mines west of Frank, it might permanently close the pass. The town of Frank would be wiped out with a fearful toll of life. These are some of the risks that are being taken by tampering with the foundation of this mountain. It

was

was unsafe to do what has recently been done in the way of mining. This was pointed out before this work was started and the present unfavourable condition of Turtle Mountain as compared to last year, shows that the opinion then expressed was well founded. No further mining of the seams near the base of Turtle Mountain can safely be done.

With regard to the question of a deep gravel filled channel in the valley at Frank I cannot speak positively. Three possible hypotheses suggest themselves —

(1) The channel encountered at Coleman may have had an outlet through Crowsnest Pass. I do not know if this could have been the case as I have never had an opportunity of examining the Pass in detail, nor has any one connected with the Survey, but I should not expect it.

(2) The valley may have suffered warping leaving a deep local basin at Coleman.

(3) It may have discharged through the gap at Frank. This hypothesis seems the most probable. If such a channel exists it would likely be narrow, a canyon in fact.

I do not know of any facts yet brought to light that would

Ottawa, Nov. 3rd, /10.

would enable one to definitely decide this point, but I think the possibility is sufficient to warrant taking precautions against encountering such a channel.

I have the honour to be,

Sir,

Your obedient servant,

R W Brock

John Stocks Esq.,
Deputy Minister,
Dept. of Public Works,
Edmonton, Alta.

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

[illegible]

REPLY TO FILE 13048

OFFICE OF THE DISTRICT INSPECTOR OF MINES

MACLEOD, ALTA. Nov. 14th., 1910

Sir,

I beg to acknowledge the receipt of your letter of November the 8th. 1910 together with copy of letter of Mr. R. W. Brock, Director of Geological Survey, Ottawa, re condition of Turtle Mountain.

In regard to Mr. Brock's third hypothesis that he is of the opinion that precautions should be taken against encountering a channel to a considerable depth along side the workings of the shaft mine.

You will remember that in all our coversations on the subject of Turtle Mountainand the working of the shaft mine that I have expressed my opinion that such a channel would be encountered, made during the ice period when the valley traversed by the Canadian Pacific Railway was in the ice period the medical moraine, and that the glacier did, in my opinion, discharge through the gap at Frank and that the movements of the glacier were toward the Atlantic Ocean and in its movement would wear out a channel, which is now filled with glaciel deposit. The reason why the coal seams are left is because the hanging wall and foot wall of the vein is composed of hard flaky standstone able to resist the action of the glacier to a great extent, therefore the glacier took the line of least resistance that is close to the foot of the cretaceous limestone of the mountain and a channel will be cut in the immediate vicinity.

John Stocks, Esq.,
Deputy Minister,
Department of Public Works,
Edmonton, Alta.

My theory is that during the upheaval of Turtle Mountain and Goat Mountain the rocks comprising the hangings and foot wall of the vein being pushed from a horizontal to nearly vertical position must have been cracked and fissures made somewhere in the sides of the vein, and if a gaping fissure is met with in the West wall extending to the channel spoken of by Mr. Brock it will flood the shaft mine with water.

I am of the opinion that no more mining should be done. Suppose that the method of mining is safe in the shaft mine and that all the coal has been extracted without any disturbance whatever, will this condition of things always be so. Will the timber that is put in always keep the walls of the vein secure? I say no. That the strain on the walls from the mountain will in the near future crush any timber which may be put in and so cause the mountain to come down and the method adopted in the shaft mine, as that when all the coal is taken out makes the repairing of any timber dangerous. In my opinion this is not a question of today or for five years, it is a question of keeping the mountain in-tact as long as possible.

Your obedient servant,

Elijah Heathcote

District Inspector of Mines.

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

REPLY TO FILE 13048

OFFICE OF THE DISTRICT INSPECTOR OF MINES

MACLEOD, ALTA. Nov. 21st. 1910

Sir,

I beg to submit my report on the Gob fire which was found in the old mine at Frank on November the 11th. 1910. Telegrams reached me on the 12th. of November informing me of the gob fire in the old mine at Frank and of the fatal accident at Blairmore, having to investigate and attend the inquest of the fatal accident at Blairmore. I could not investigate the cause of the gob fire at Frank before the 16th. of November.

13016

The part of the mine being sealed off, I could not investiga the seat of the fire, but the fire is supposed to have started by spontaneous combustion and was first discovered at the third cross out, above the parallel to 71 m anway having worked its way from the old workings somewhere in the vicinity where the old jugulars were driven at 75, 76, 77 chutes. From this point inwards the coal has been taken out to the fault above, and on hearing of the fire my fears were that the fire might spread to gas, which I knew existed two years ago up the old 82 angle, which was driven to try and put through to the surface for a second outlet.

On enquiry I am informed by Mr. EMerson that he travelled around the old workings as far as he was able to do so, and found the fire at the third cross-out 150 feet vertically above the main gangway. He also informs me that black damp surrounds the fire and that there is no danger of the fire igniting any gas.

John Stocks, Esq.,
Deputy Minister of Public Works,
Edmonton, Alta.

Directly above the fire and 200 feet above the main gangway black damp was found formerly, and up 71 chute and 150 feet above the main gangway, and is 100 feet South or inwards from the fire, up the parallel angle, to 71 manway 450 feet.
above the main entry
An angle is driven at 45 degrees and 150 feet long from the top of this angle a cross cut was formerly driven into the old workings, and when put through into the old workings black damp was found, at 84 chute, black damp was found 125 feet above the main gangway which we assume that from the seat of the fire inwards to 84 the old workings must be full of black damp.

12 counter South forms a junction with the top of 71 manway and for 300 feet above 12 counter in the old workings black damp was found formerly, this being proved when the old pillars at this point were taken out. Mr. Emmerson also went to the outlet at No 3, and could not smell any fire in the return air.

The fire is sealed off by a baord stopping at 64 chute in the main and counter gangway. These stoppings are built of boards one foot apart filled in with clay. Another stopping is built three thousand feet from the entrance of the mine on the main gangway.

These stoppings are placed in a good position, the ramifications of the old workings in the mine are such that it is almost impossible to know what to do in the case of a gob fire.

If the fire is put out, it is the intention of the Company not to work any more up 71 manway.

The slope is working because this portion of the mine is outside of the fire zone.

Your obedient servant,

Elijah Heathcote

District Inspector of Mines.

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

WHEN REPLYING
DO NOT WRITE ABOUT MORE THAN
ONE SUBJECT IN ANY LETTER
AND [illegible] TO OUR FILE
NUMBER

REFER TO FILE 13048

OFFICE OF THE DISTRICT INSPECTOR OF MINES

MACLEOD, ALTA. December 31,1910

Sir,

In accordance with a consultation held on the 29th December with the Provincial Inspector of Mines I investigated the conditions of the squeeze in the levels of the shaft mine of The Canadian Coal Consolidated Limited, Frank, and herewith beg to submit my report.

The south side entry 330 ft is about 1000 ft from the bottom of the shaft and stops at a fault; the timbers over this level do not show signs of a squeeze as yet.

The north entry 330 ft is about 3000 ft from the bottom of the shaft and from the shaft pillar which is 600 ft from the shaft; and for a distance of 300 ft along the entry from the shaft pillar and directly under the 240 and 120 levels a squeeze is seen. The entry timbers being bent and in some parts of the entry the timbers have been renewed. The coal is hauled on the entry with horses. 18 men work on the morning shift; 4 men travel the entry to gain their working place; 16 men travel down the smelter angle to gain their working place. Breast work in the mine is abandoned and the angle system of working the coal is being adopted.

In the 240 and 120 ft levels beyond the shaft pillars a heavy squeeze is breaking the timbers and crushing the small pillars of coal. The sides of the vein are coming together; in the 240 ft level north side I ent 100 ft on the stulls beyond the shaft pillar, clinging to a rope, unsafe to go any further. The south side is the same, north side of 120 level the sides of the vein are crushing and breaking the timbers, could not travel beyond 600 ft from the shaft-unsafe to do so. Could not travel past the fan shaft on south side of 120 ft level on account of ice

4630

blocking the way.

From the surface pillar down to the 330 ft level the sides of the vein are moving and heavily squeezing.

Posted the following report:

"That I have examined the 330, 240 and 120 ft levels north and south of the shaft and find a heavy squeeze in 240 and 120 north and south pillars; practically all caved out. Beyond the shaft pillar on 330 level north a squeeze is on the level and I consider the level to be dangerous for men to travel to and fro along these levels."

In this mine the coal pitching at 86° and the coal having been nearly all extracted by breast work leaves the waste hanging directly over the main entry and should large falls of rock take place there is nothing to prevent the rock from falling through to the main entry. I interviewed Mr. A. Muller, General Manager, and he said that he would not stop the main entry north side.

Your obedient servant,

Elijah Heathcote

District Inspector of Mines.

John Stocks, Esq.,
Deputy Minister of Public Works,
Edmonton,
Alta.

## Appendix 1.5

Provincial Archives of Alberta
File #77.237/48a

3695

GEOLOGICAL SURVEY
R.W. BROCK, Director.

DEPARTMENT OF MINES
CANADA.

L

Str. Prince Rupert Aug 22 1911

Mr. John Stocks,
Deputy Minister of Public Works
Edmonton
Alta.

Dear Sir,

A commission, consisting of Dr. C. W. Hayes chief Geologist of the United States Geological Survey, Mr. George Rice, Coal Mining Engineer, of the United States Bureau of Mines, and Dr. W. G. Miller, Provincial Geologist of Ontario, has been appointed by the Dominion Government to enquire into the condition of Turtle Mountain, and to delimit the area, if any, at the base of the mountain, which should be left undisturbed by mining operations.

They have been called to begin their investigation on Sept 21st. It would be of great assistance to the Commission to have Mr. John Stirling present at Frank during these investigations.

You will be notified if it is found necessary to alter the date.

Yours faithfully
R W Brock

Noted JS

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF PUBLIC WORKS

A/B. REFER TO FILE 13048

OFFICE OF THE DISTRICT INSPECTOR OF MINES

MACLEOD, ALTA.

Lethbridge, 1st April, 1912.

Sir,-

On March the 27th, I inspected Mine No.48, operated by the Canadian Coal Consolidated Ltd. at Frank, re breaking of timbers in the Old Mine.

I found nothing that would lead me to think that there was any abnormal stress on the timbers. I saw timbers that has been in for years, practically showing no signs of breaking. Timbers that have been set during the strike, are as good as the day they were put in.

In the entry going south from the bottom of slope, there is only one timber broken, and as the entry is driven a distance of over 3000', I would not consider that there was any abnormal stress in this part of the mine either.

Your obedient servant,

Francis Aspinall

DISTRICT INSPECTOR OF MINES.

John T. Stirling, Esq.,
Provincial Inspector of Mines,
Edmonton.

## Appendix 1.6

Provincial Archives of Alberta
File #77.237/48c

V/

PRESIDENT'S OFFICE

THE UNIVERSITY OF BRITISH COLUMBIA
100 HASTINGS STREET WEST
VANCOUVER, B.C.

File No 1320

Oct 1 1914

OCT 5 1914

John T. Stirling, Esq.
Chief Inspector of Mines
Edmonton, Alta.

Dear Mr. Stirling,

Your letter of Sept 21 has been forwarded to me here, and a copy kept on file in the Department at Ottawa. I have resigned from the Government service to become Dean of the College of Mining & Applied Science, University of B.C. & will be residing in B.C., and I hope in closer touch than ever with mining men & affairs.

I wish that Company would leave the Coal Seam alone. But I suppose you cannot stop them mining the area not specifically labelled unsafe, although the Commission clearly indicated that any mining was risky. This is also my opinion and I am glad that you have put limits on what they may do in the way of mining.

You will remember that the Company agreed to abide by the decision of the Commission if one was appointed to delimit the danger zone, and it was for this reason and on this assurance that the Commission was appointed. You have consequently a moral as well as a legal right to keep them out of the area included by the Commission in the danger zone.

With kind regards,

Yours sincerely

RWBrock

Appendix 1.7

Provincial Archives of Alberta
File #77.237/48h

ALBERTA

REFER TO FILE 13048.

Blairmore, Alta, March 21.1917.

Dear Sir:-

In reply to your letter of the 7th.Inst. re-squeeze in the Shaft workings of Mine 48, operated by the Franco-Canadian Collieries Ltd., Frank, I beg to advise you that I visited this mine again on the 15th.Inst. and further investigated the "Squeeze". I submit the following report thereon.

I travelled along the 120' level for about 400' North of the Shaft, at which point the pillars from below had been taken out. I failed to find any indications of "Squeeze", all the timbering being in good condition.

I travelled along the 240' level for about 100' North of the Shaft, at which point I found pillars had been taken out from below. I failed to find any indications of "Squeeze". All timbering from the Shaft to this point being in good condition.

I also travelled along the 330' Level and found a "Cave" of loose coal had taken place about 500' North of the Shaft, this prevented me from going any further. For 150' back from the "Cave" I found indications of heavy side weight and also a little top weight. I found the hanging wall leaning over in loose slabs and all timbers badly broken for this distance.

On the 700' level, or the entry running North from the bottom of the Slope, I found slight indications of side and top weight on timbers along the counter entry at No.17 Angle, more pronounced at No.20 Angle and, very pronounced at No.23 Angle, from No.23 Angle to face of counter entry I found indications of "Squeeze" less pronounced.

I found timbers in all places from No.17 Angle to No.23 Angle badly smashed by the "Squeeze", they were being replaced by new timbers which were already also showing signs of "Squeeze". Indications of "Squeeze" from the top downwards of all Angles from 29 to 32 inclusive.

The last Angle being driven is No.32, being about 175' back from the face of the entries.

I could not find any indications of extra weight on the timbers along the main entry.

I found quite a number of men engaged in renewing timbers in the different Angles and along the counter entry.

The No.17 Angle is about the middle of the public road between Frank and Blairmore, about 165' South East of the Zinc Smelter. No.30 Angle is about 140' North of the Zinc Smelter. This point is just about entering underneath the foothills of the Goat Mountain.

I could not find any indications of disturbance on the surface in the above localities.

Prior to the above "Squeeze" taking place four pillars had been taken out at the top of and between Nos.26 & 27 Angles, leaving pillars about 40' square immediately below the 330' level. Immediately South of these pillars there was a fault running in a North Easterly direction. This fault crosses all Angles in a N.E. direction down to the main entry, practically pinching all the coal out, coal has been found again by driving about 15' horizontally through the fault.

The coal in this mine is soft and friable all pillars are about 30' by 30'. No mining going on in the above workings at present except the driving of the main and counter entries.

From the last report of the management of this mine the "Squeeze" is easing up.

Youre truly,

W. Shaw.

Dist. Inspector of Mines.

John T. Stirling, Esq,

Chief Inspector of Mines,

Edmonton.

ALBERTA

REFER TO FILE 13068.

Blairmore, Alberta, April 9, 1918.

Dear Sir:

I beg to advise you that on the 3rd inst. about 10:30 P. M. I visited mine No. 48, operated by the Franco-Canadian Limited, Frank for the purpose of investigating into the cause of ~~[illegible]~~ an explosion which took place in the old mine in No. 98 chute on that date about 6:30 P. M.

I learned on arriving at the mine from the examiner L. Evans who was on shift at the time, that as he was travelling along the main entry, in the vicinity of No. 30 to No. 35 chute, towards the face, he met the men of the afternoon shift coming out of the mine and they stated that there had been an explosion. He (Evans) stated to me that he noted nothing unusual on his way out or in.

Upon returning to the mine mouth it was found that the twenty-eight men in the mine at the time of the explosion had returned to the surface.

I also learned from Tom Davies the overman, that one of the men burned named Vincel Blecha, Miner, who was working in No. 98 chute with his partner Frank Pokorney, who was also burned, on being questioned by Davies, stated, that he was standing below the second battery marked "A" on the plan awaiting his partner bringing a post up to him when a heavy cave of coal took place further up the chute, above the top battery marked "B" on the plan and fire.

About 8:30 P. M. the same evening Tom Davies overman, L. Evans Examiner, D. Bosco and Ed. Sutherland, Miners, went into the mine and up to the counter entry, which is the return airway, by No. 40 chute and saw smoke travelling in the air. They next proceeded along the main entry and went up No. 88 chute and found the smoke pretty strong, then No. 94 chute was tried, the doors in the bulkhead probably done being found open and the smoke in the return dense. They next proceeded to No. 99 chute and found the bulkhead blown out, coal and a part of the bulkhead lying on the main level.

As Davies knew that the inside places would fill up quickly with gas owing to the short circuiting of the air current he left 94 and 99 in the condition in which he foundthem and all returned to the surface.

On his way in at about 30 chute he noticed the air current check and on returning to the surface inquired of the men who were working on the main level on the afternoon shift if they noticed any coal or timber on the main level in the vicinity of 99 on their way out, they said there was nothing there, so that in his opinion a second explosion probably took place.

I gave instructions to Tom Davies overman as J. Brown, Manager, was not in town, that no one was to enter the mine until I inspected the condition of the return air next morning.

I checked over the lamps which had been used on the shift and found all except two, which were those of the two men who were hurt in No. 98 angle.

According to T. Davies he and the day shift examiner, J. Hutton had an inspection in this place about 1:30 P. M. on the day of the explosion and found all clear; a cave having taken place at the top of 98 a few days previous.

Upon examining the Examiner's Daily Report Book I found no report of gas.

On the morning of the 4th instant I inspected the return air and found smoke still travelling and a smell of burning.

The Water Gauge immediately after the explosion recorded 4" wheras it normally stands at 3.8 inches. On the 6 instant it had reached 4.1 inches. equal parts of alcohol and water are used in the gauge.

About 6 P. M. on the 4th instant I again inspected the return air and found it clear of smoke, no gas present but still slight smell of burning and decided to allow the pumps to be started and the horses fed which took 44 minutes in all to accomplish. If the pumps had not been started the mine would have been lost.by the pumps becoming submerged.

During the morning of the 4th I learned that a fire existed in 1910, immediately above the point of the explosion.

In making investigations I found from Evan Morgan and John Anderson, two miners, that they, in 1910, were working on No. 72 angle about the 3rd or 4th cross-cut. Morgan states that he observed on looking up the cross-cut the coal seam on fire and immediately withdrew and informed J. Emerson who was then manager. Instructions were then given to build stoppings marked "C" and "D"; these were built by Morgan and Anderson.

The air at this time was travelling in the main level and returning to the surface, by what was known as No. 3 Angle, via No. 72 Angle.

X

The entrance to No. 3 on the surface was blocked up with clay but about three years ago I learned that all this clay had been washed out by the action of surface water.

On the 8th instant Messrs. Shaw, McDonald and myself inspected the surface in the supposed location of No. 3 ~~and~~ although not actually finding No. 3 owing to it possibly being ~~cut~~ filled up by snow we found some very large caves right along crop in the supposed vicinity of No. 3 but no indications of fire or smoke issuing from the caves.

On the 5th inst. D. McDonald and myself about ten A. M went into the return and found a slight smell of burning still present., and a hase about five hundded feet down the slope from the point where the slope is entered from the main level, this hase disappeared as we approached the point where the counter entry enters the slope.

Prob. due to [illegible]

On the 6th inst. Mr. Shaw and myself along with J. Brown Manager and T. Davies examined the return air-way to the point where the counter entry enters the back slope and found the air clear of smoke and free from gas and smell. I measured the air and found thirty ( 30,000) thousand cubic feet per minute circulating, the hygrometer recording 46 100% R. H.

Barometer outside 24.22". Thermometer outside 32 F.

We then proceeded to the pumps and stable and found the general condition of the mine and timbering to be good free ~~free~~ from gas, smoke and smell and ventilation good.

In the intake about 800 feet out-bye from the top of the hoisting slope I found 25,000 cubic feet of air per minute.

On returning to the surface we granted J. Brown permission to allow of men entering the mine at intervals when necessary to start & ~~to~~ lubricate the pumps and asked him to withdraw the horses with the least possible delay and allow no one to enter the mine beyond the stables for an indefinte period, he previously having suggested that no one ought to enter until Monday the ~~xxx~~ 8th inst.

On the 7th instant we found that no change had taken place and in the afternoon about 2:30 P. M. I personally delivered to J. Brown Manager, notice under Sec. 53 of the Mines Act asking him to withdraw all men from the mine and giving in the said notice my reasons for taking such actions. A copy of this notice I have already forwarded to you in Edmonton. On the 8th inst. men were still entering the mine and I reported same to you by letter on that date.

On the 8th inst. we examined the two men who were burned and from their statements find that Blecha had dug a hole for a post to hold a check board at the battery marked "A" on the plan and was awaiting his partner Pokorney, bringing a post up to him when a large cave of coal took place above the second battery marked "B" on the Plan, followed by flame which he says came rushing down upon him; Pokorney being knocked down the chute seeing lightning and Blecha when regaining his senses immediately making for the main gangway. Blecha states, that at the time of the explosion his Wolff safety lamp was hanging on his waist belt. he seems positive that his lamp played no part in the explosion as the flame came from above him.

[illegible]

Nick Morris and his partner who were working in No. 97 Angle which was holed and timbered through to the old main levelstates that he felt the blast, it putting out one of their lamps and that he thought a cave had taken place but immediately saw smoke coming through ~~the~~ crosscut, when he and his partner at once made for the main level and found that men had been burned.

On the 9th instant about 10:30 P. M. we learned from J. Brown that he himself entered the mine to about thirty feet beyond No. 99 Angle and reports as follows:- No trace of gas beyond 99 as far as he went but the usual explosion smell, part of the bulkhead at 99 broken down owing to pressure of coal on same, about half ton of coal lying on the main entry opposite 99. He found the doors of 99 bulkhead open and partially closed same on his way out. He also stated that knowing of the unknown danger existing by present workings having hold through into the fire area a danger will always exist as no means of getting to the seat of the fire is possible. He informed us that he is going to take steps to have the ice removed from the hoisting slope and thereby allow of the horses being withdrawn from the mine. This afternoon he told us that the cutting of the ice had commenced.

Our summary of the whole case is as follows: viz- After examining a number of men who were employed in the section which has made connection to the fire area and also a numberof men who were employed in 1910 in the section where the fire originated and who actually saw the fire; we consider that owing to the numbrous caves on the surface that the fire has not been extinguished owing to leakage of air through the above caves and that at any time another explosion may quite possibly take place. From information we have received it is not possible to get into the fire area to inspect it and thereby ascertain what the actual condition is as the old ~~being~~ main level is caved both at 97 and 102.

Yours truly,

Wm Stevenson Jnr.

W. Shaw.

Duncan McDonald

District Inspectors of Mines.

To John T. Stirling,

Chief Inspector of Mines,

Edmonton, Alta.

Department ... Correspondence
APR 11 1918
Edmonton, Alberta.

**Franco-Canadian Collieries Ltd.**

MINES & OFFICES
FRANK, ALBERTA, CANADA

ADDRESS ALL CORRESPONDENCE
TO THE COMPANY

*Frank, Alta.*

13048

We, the undersigned, a Committee of the Officials of the Franco-Canadian Collieries Limited of Frank, beg to report as follows:-

We entered the Old Mine at 9.20 A. M. this date and proceeded down back slope and along the main gangway of said mine; which is the main Intake Airway, to chute no. 40, when Mr. H. Campbell went up chute 40 to counter entry or main return airway and finding everything clear he came down to main entry and so reported.

We then proceeded along main entry to chute #88 where three of the party went up to inspect the counter or main return airway a second time. On finding everything clear they returned to main entry and so reported. We then proceeded along main entry until we were blocked by a large run of coal at the bottom of 101 chute, where we found that the air was still travelling in towards the face of entry. We then returned to chute no. 99. All us of went up this chute to counter entry. After inspecting counter entry both in by and outside of chute no. 99 we found that is was perfectly safe to ascend or go up angle 98, which three of the party did, leaving two of the party at the bottom of angle no. 98.

As a precautionary measure, Mr. Davies, Mine Foreman, who was leading, went up to the battery where the two men were working that were burned. Everything was found in a perfectly safe condition with just a slight cap of gas showing in the lamp just below the battery. This was caused, no doubt, by the crosscut between 98 and 97 angle being closed and the air being short-circuited; thereby taking its course down 98 angle to a lower crosscut between 98 and 97 angles.

A close search was made while up where the men had been working for their lamps, but no trace of the lamps could be found. It is natural to suppose that the lamps had been carried down the chute with the coal. The battery was found in a perfect condition and run full of coal.

There was absolutely no indication whatever of an explosion of gas ever having taken place at this point, nor was there any indication whatever of any fire having been burning at the point where the men were at work. We made a

Franco-Canadian Collieries Ltd.

MINES & OFFICES
FRANK, ALBERTA, CANADA
ADDRESS ALL CORRESPONDENCE
TO THE COMPANY

Frank, Alta.

careful inspection of this angle from the battery down to the counter entry for any indications of cokeing or other signs that might have been left by any fire that might have been burning at this point, but we found none.

On returning to the outside three of the party travelled the return airway to chute no. 40, the other two going out by travelling down chute no. 99, thence along main entry to chute no. 40 where they were joined by the rest of the party and all came out to the surface together at 12.50 P. M.

Signed: John Brown Manager.
T Davies Mine Foreman.
Llewellyn Evans Fire Boss.
George Coupland Fire Boss.
Henry Campbell Fire Boss.

Frank, Alta. April 11th, 1918.

## Appendix 1.8

Provincial Archives of Alberta
File #67.303 Box 94

DEPARTMENT OF GEOLOGY AND
MINERALOGY

UNIVERSITY OF ALBERTA
QUAECUMQUE VERA

EDMONTON, ALBERTA
CANADA

June 28th, 1935.

Hon. J. J. McLellan,
Minister of Public Works,
Administration Building,
EDMONTON, Alberta.

RE: TURTLE MOUNTAIN, ALBERTA.

Dear Mr. McLellan:

In my letter to you dated August 20th, 1934, I reported, in brief, on the character of the work that had been undertaken by the Geodetic Survey of Canada in establishing bench marks on the summit of Turtle Mountain. Since that time I have received, from Mr. N. J. Ogilvie, Director, Geodetic Survey of Canada, data on the survey which was undertaken on your request. On separate sheet I am forwarding to you these data as received from the Director, Geodetic Survey of Canada.

It is possible that I might have an opportunity to visit this district some time during this summer and if so I will observe the bench marks we established on Turtle Mountain. If any change is noticed in the condition of this mountain I will report to you accordingly.

Yours very truly,

J. A. Allan

J. A. ALLAN,
Professor of Geology

ENCL.

## Geodetic Survey of Canada.

Bench marks established on top of
Turtle Mountain in July-August,
1934, by precise levelling from
Frank, Alberta.

| B. M. No. | Description and Elevation. |
|---|---|
| 65-T | In highest point of rock on Third peak, 25 feet 6 inches from Alberta Government Geological Survey station, on a magnetic bearing of north 220° east, said Geological Survey station being marked by a rock cairn. Tablet set vertically. Elevation 7237.643. |
| 66-T | In rock ledge about 2 feet in length in a sloping rock face on Third peak, 13 feet from bench mark No. 65-T, above described, and on the far side of the latter from rock cairn marking Alberta Government Geological Survey station. Tablet set vertically and hidden from view by a covering of gravel. Elevation 7229.927. |
| 67-T | In top of rock on South peak, 5 ft. 6 in. south of Alberta Government Geological Survey station, which is marked by a circle of red and green paint. Tablet set vertically. Elevation 7220.193. |
| 68-T | In top of rock on North peak, 14 inches south of Alberta Government Geological Survey station, which is marked by a square of red and green paint. Tablet set vertically. Elevation 6921.021. |

Additional points connected during the
levelling:-

| Third Peak | Elevation |
|---|---|
| Station "B" (blue triangle) | 7226.685 |
| Nail in stake marking Geological Survey station | 7238.609 |
| Highest point of rock | 7238.795 |
| **South Peak.** | |
| Geological Survey station | 7220.521 |
| **North Peak** | |
| Geological Survey station | 6921.207 |
| Highest point of rock | 6925.668 |

DEPARTMENT OF GEOLOGY AND
MINERALOGY

UNIVERSITY OF ALBERTA

EDMONTON, ALBERTA
CANADA

3058.

August Twentieth,

1934.

Hon. J. J. McLellan,
Minister of Public Works,
Legislative Buildings,
Edmonton

Dear Mr. McLellan:

I take this opportunity to inform you that I have carried out your instructions as given to me in July with reference to a visit to the Turtle Mountain district to meet the representative sent by the Geodetic Survey of Canada. On July 24th I left for Blairmore where I met L. O. R. Dozois, the surveyor who was sent to Alberta by Mr. N. J. Ogilvie, Director of the Geodetic Survey of Canada. Mr. Dozois was instructed to carry levels from the valley to the top of Turtle Mountain and to establish geodetic bench marks on three peaks on top of Turtle Mountain.

I spent three and one-half days with Mr. Dozois and during that time we selected the route along which the line of levels would be carried and also selected the sites for the bench marks on the north peak, the south peak and the third peak on the top of Turtle Mountain. On my return to the office today I have received a letter from Mr. Dozois in which he states he completed the work on Turtle Mountain on the afternoon of August 16th. He has established bench marks on these three points and his notes will be sent to Ottawa where they will be compiled. I understand from Mr. Dozois that all information relative to these bench marks will be compiled in Ottawa.

When at Turtle Mountain I remeasured the gauge stations that I had established in various fissures on the top of Turtle Mountain that I had established during 1933 survey. I found that with few exceptions the cracks had widened appreciably, especially those in the south peak. Some of the cracks had widened as much as two inches in the intervening twelve months. This change indicates that south peak is unstable. Small blocks tend to break away from the eastern face of Turtle Mountain and during this last visit I observed a number of small slides centered chiefly on the north-east face of the south peak. With the establishment of geodetic bench marks on the three peaks and the presence of these gauge stations, it should be possible to observe any movement that may occur, provided the bench marks are checked for position from time to time, and also the width of the fissures at the gauge stations.

When in Blairmore I discussed with the R. C. M. P. the object of the bench marks that were being established by the Geodetic Survey of Canada and pointed out how important it was that these bench marks should not be destroyed, either willingly or thoughtlessly, by those climbing Turtle Mountain. There are many visitors to the top of Turtle Mountain and there is always the danger that bench marks will be destroyed. I consider it is important that this matter should be drawn to the attention of those climbing the mountain in the form of notices by the police or in some other manner. I found that one of the gauge stations that I had established last July, and possibly two, had been destroyed intentionally by someone.

I would expect that details on the results of the survey made by Mr. Dozois will be supplied to your department by the Geodetic Survey of Canada at a later date.

I am enclosing with this letter my accounts in connection with this examination and trust that the same will be satisfactory to you.

Yours very truly,

J. A. Allan

J. A. Allan,
Professor of Geology.

Encl.

September [illegible]

Hon. T.G. Murphy,
Minister of the Interior,
Ottawa, Ont.

Dear Sir:-

Considerable attention is being given to the conditions of stability in Turtle Mountain at Frank, Alberta. During the past summer a plane table survey has been made of the major fissures along the top of Turtle Mountain. There is evidence that there is movement in what is known as South Peak.

It has been suggested that if the exact elevations of three points on Turtle Mountain were determined, namely North Peak, South Peak and Third Peak, which is about 700 feet south of South Peak, that any movement in South Peak, which is the unstable area, might be observed in future surveys.

The Geodetic Survey of Canada has established a bench mark at Frank, Station No. [illegible]. Therefore request is made to have bench marks established by the Geodetic Survey of Canada on the top of Turtle Mountain at the three points mentioned above.

A further request is also made to have a seismograph station established and a seismograph installed at Hillcrest or vicinity, in order that any minor tremors may be recorded. Tremors have been reported in this district and early this summer a tremor of considerable magnitude is reported to have been felt in the area of Hillcrest.

As the safety of life and property is concerned, it is of utmost importance that any tremors in this district should be recorded, more [illegible]

[illegible] were described by [illegible] [illegible] photographs [illegible] it is [illegible] [illegible] [illegible] if they were [illegible] [illegible] districts.

[illegible] information on the possibility of [illegible] survey of Canada [illegible] in the [illegible] district, and in [illegible] the elevation of points [illegible] would be greatly appreciated.

In addition to any information that may be available along the above lines, [illegible] of this district [illegible] possible to photograph [illegible] I am sure that it would be well worth [illegible] from the public point of view, and if there is any aerial photographing [illegible] proposed in the near future I shall [illegible] your [illegible] for this purpose.

I would be glad to hear from you [illegible] these proposals.

Yours very truly,

Edmonton, Alberta
January 12,1932.

**MEMO FOR PREMIER BROWNLEE.**

With further reference to your memorandum asking me to confer with Mr.J.D.Robertson, Deputy Minister of Public Works, regarding Dr.Allan's report on Turtle Mountain and to have a check-up of the mine workings of Hillcrest Collieries made, I beg to submit the following information having gone into the matter with Mr.Robertson.

On going over Dr.Allan's report I find he states on Page 5, that the recommendations of the Commission of 1911, appointed to investigate the conditions of Turtle Mountain, were both carried out, these being as follows:

1. The abandonment of mining operations in the vicinity of Turtle Mountain.
2. The abandonment of Frank Townsite and removal to a new and safe site.

Dr.Allan appears in error in stating both these recommendations were carried out as the first one was not.

In 1903 the workings in the drift mine were in 5500 feet on the strike of the seam and the slide extended about 3500 feet or within 2000 feet from the face of the workings.

In 1910 the Commission states the entries were in 6300 feet measured along the outcrop and I find from 1910 to 1917 the workings of the Frank Mine were further continued and same were in much further in 1917 when that part of the mine was finished.

From 1910 to 1917 a large proportion of the coal mined was taken from pillars and this would more seriously affect the stability of the mountain than if the coal had only been taken from entries or rooms.

In my opinion, the fractures now found in the South peak were caused by the further extension of the mine workings from the Frank mine from 1903 to 1917 and the withdrawal of pillars from the point near where the slide took place in 1903 to where the workings finished in 1917, roughly an additional 5000 feet.

This additional working has, I believe further extended the rupture and cracks in the South peak.

We have made a checkyup of the Hillcrest mine workings and find there is none proceeding now in the direction of Frank and a small area which did approach in that direction, was finished in 1916.

The Hillcrest mine is located in a different fold of the measures from that of Frank according to Dr.McKay of the Geological Survey and the attached sketch has been taken from a model prepared by him.

Hillcrest Collieries Ltd. are working No.1 seam which would corelate with the one mined at Frank. All active workings of Hillcrest mine are behind the South Peak and continued operation of the No.1 seam at Hillcrest cannot in my opinion, affect the stability of Turtle Mountain, as the workings are not proceeding in the direction of Frank workings.

If in the future, Hillcrest Collieries started operations in No.2 and No3.seams some restriction may have to be laid down regarding their operation of that part of the seams where they approach towards Turtle Mountain but this may not be for many years.

Another favourable feature at Hillcrest is that the seams are not highly inclined, whereas at Frank they are very steep and in some places vertical.

Mr.Heeley, District Inspector of Mines, examined Turtle Mountain in October 1931 and has expressed the opinion that in the case of a major slide taking place, there is the possibility of the debris overflowing the valley between the top of the South Peak and the town of Hillcrest and the overflow causing damage and possible loss of life at Hillcrest.

[illegible] the opinion that the South Peak should be examined [illegible] losives engineer as he thinks the dangerous overhang [illegible] be safely removed by blasting.

I have not visited the top of Turtle Mountain personally, but having read Dr.Allan's report and viewed the mountain from Hillcrest Collieries office and cannot conceive of any slide of sufficient magnitude taking place to affect the town of Hillcrest itself.

The conclusions I have reached are;

1. That the further fracturing of Turtle Mountain has been caused by the continuation of mining operations in that area from 1903 to 1917 and particularly due to the extraction of the pillars on this highly inclined seam;

2. That the present operations of Hillcrest Collieries Ltd., cannot in any way affect the stability of Turtle Mountain as the workings are going in an altogether different direction and the seams are in a separate fold from the Frank seams;

3. If No.2 or No.3 seam is in future operated by the Hillcrest Collieries Ltd.,some consideration will have to be given to what effect its operation on the north side of the basin will have on Turtle Mountain and if likely to affect its stability conditions will have to be laid down governing the operation of these seams at the points referred to.

I have discussed some of these points with Mr.Robertson and am sending him a copy of this memorandum so he will have same before him when making his report in connection with Turtle Mountain.

CHIEF INSPECTOR OF MINES.

1905

## THE CANADIAN AMERICAN COAL & COKE COMPANY, LIMITED, Frank, Alberta.

F. A. Hill, general manager.
Lawrence Harris, mine superintendent.
John Robertson, mine manager.
Alex. McGregor, pit boss.

The improvements at this mine are the installation of a new fan and a battery of boilers. The trail rope haulage in the mine has greatly reduced the cost in that department. The system of working the mine has had to be altered several times and I think improvements have been made especially to the advantage of the safety of the miner although there will always be elements of danger in this mine to be met with that cannot be eliminated so easily as in a flat seam or one with a less degree of pitch. An unfortunate incident happened in the workings on the 19th April last whereby the inside workings went on fire, the cause of which is still unaccounted for. I was wired for and immediately proceeded to the mine. After consulting with the management and an examination of the plans as to the point at which the fire had been closed off by stoppings, I decided to call in another inspector and mine managers in consultation. At my invitation Messrs. Drinnan and Colville, mine managers of the Crow's Nest Pass Coal Co., Mr. Whiteside, general manager of the West Canadian Collieries, and Inspector Morgan, of British Columbia, met me at Frank the following morning. With the mine officials and representatives of the miners' union the foregoing gentlemen and myself entered the mine and examined the stoppings and general condition of the mine carefully. After a conference it was decided that it was quite safe for the mine to be opened outside the stoppings. After the inside workings being closed for over a month, the stoppings were opened and the seat of fire examined but found to be still burning with little chance of putting it out. That portion was again closed up and a request made by me to the management that the mine should not be opened until the new fan was in condition to thoroughly handle the problem of ventilation and new openings made to the surface so that the air could be divided into splits. This idea was carried out and the inside area again opened up last month when it was found that the fire had been entirely damped out. The only evidence left of the fire was charred wood and some of the coal coked. The mine is now assuming a normal condition.

## THE WESTERN CANADIAN COLLIERIES, LIMITED, Blairmore, Alta.

O. E. S. Whiteside, general manager.
W. P. Williams, general mine superintendent.
W. W. Leach, mining engineer.
Raoul Green, mine manager, Lille Colliery.
Ralph Lowrie, pit boss.
Chas. Emerson, mine manager, Bellvue Colliery.
John Anderson, fire boss.

# Appendix 2

# Glenbow Archives

Mr. J. S. Dennis

CB

COPY.

CALGARY, ALTA. 16th December 1915 - L

My dear Macintyre,

Yours of the 7th re Frank Slide is before me. I do not know that what I can give you will be of very much interest, but I will give you what little I can.

The slide took place on .... day of April, 1903. All sorts of wild rumors were going around concerning the disaster, and evidently the Deputy Minister of the Interior, Mr. Smart, was very much exercised over what he was receiving in this matter. The result was he telegraphed me to secure a detachment of Mounted Police, get a special train, and proceed to Frank and take charge. As to taking charge, the Department of the Interior had no jurisdiction whatever, that was a matter that rested with the then Territorial Government. However, a good soldier obeys orders whether they are legal or not. I applied to the Police and got a number of men, and a special train, and left here about five o'clock on the evening following the day of the disaster. I had received my instructions about two hours previously.

We made good time to Macleod but at that point we were hung up for some time and did not leave Macleod till between eleven and twelve o'clock on the special train. Our cars consisted of a Colonist sleeper and a baggage car. A lot of persons attached themselves to the train at Macleod.

We reached the east end of the slide between two and three o'clock in the morning, and we did the most foolish thing that any sane men would be guilty of. We climbed over that broken rock with the aid of a lantern for between three and four miles into Frank. Why we did not break our necks, as the rock was covered with fine dust, is something

I have

F. W. Macintyre, Esq.,
P. O. Box 1290,
VICTORIA, B.C.

I have never quite understood. We reached Frank when it was just getting day light, slightly after four in the morning, and I think I am safe in saying that there were not fifty people in the town in bed and of those awake there were not 3% sober.

You could not make anyone believe that it was not volcanic action that caused the slide, and it was quite easy to understand why that conclusion was arrived at. The friction of the gritty limestone sliding one piece over the other produced fire, which was reflected in the fine dust which accompanied the slide, and had the appearance of a flame being thrown up in the air exactly as one would imagine a volcano would act. It was, however, merely the reflection on the very fine dust.

The slide, as you know, crossed the Middle Fork of the Old Man, and it was feared it would dam it up, and the impression was prevalent that it would stop the stream going through and then the town would be flooded. The first thing I did on arrival was to engage the services of a young man named Robinson, who is now in the Department of Public Works for Alberta, and get him to run a line of levels, in case the rock barrier did close, to see to what extent it would flood out the town, and I found the town could not be materially injured from flood, as only a very small portion of it would be flooded. Further, this rock showed no sign of closing, and it has not to this day closed, the water still goes through this rock slide. As you know, owing to the Crows Nest Lake acting as a settlement basin a short distance west of this town, and a very sluggish stream most of the way from Crows Nest Lake to Frank, there is very little silt carried in the stream consequently there is not much possibility of closing up the rock.

On the evening of the day I arrived there, or the following morning, I am not exactly certain which, the representatives of the Territorial Government, of which Justice Haultain was then the head, arrived on the scene. About the same time also Mr. McHenry, Chief Engineer of the Canadian Pacific Railway, arrived. Mr. McHenry was quite convinced that there was certain to be another large slide within a very short time. He imagined after looking closely at it that he

could

could discover a creeping movement going on.

A local prospector, one of those local Solomons, who was a good mountain climber, accompanied by three or four local men, climbed the mountain behind the slide, and returned giving very alarming reports of the condition of the rock owing to a fissure in it, and a public meeting was held, these men spoke, and a resolution was passed calling on the Government to send up a car load of dynamite to drop into this crack and blow it up and have the mountain left in a safe condition. This matter was discussed with Mr. McHenry and he expressed the opinion that as much good would be accomplished by dropping a bunch of fire crackers in the crack as by a car load of dynamite, so that scheme fell cold.

There were all sorts of wild speculations as to the cause of the slide. There never was any doubt in my mind as to the cause, but as I was there in an official capacity I would not express my views except confidentially. At this date I suppose it is not necessary to explain the cause of the slide, I think likely you know it. It came from robbing that coal seam that was being operated. As you are aware, that coal seam was thrown up so that it was some seven or eight degrees past the vertical, and it varied in width from twelve to thirty-four feet. It was opened and operated by a party of which a Jew named Frank from Butte was the largest stockholder. Gebo (Gibault) the original promoter of this had been sent to France to attempt to effect a sale. He effected that sale, which would have given the promoters a rake-off of several million dollars, if he could only prove his assertions as to what it cost to mine the coal. To enable that assertion to be proved, robbing was indulged in. The result was there was not sufficient support left between the walls, and those coming together caused the slide.

On the evening of the second day after the catastrophe a public meeting was held and Mr. Haultain made a speech warning the people to evacuate the place, and that if they did not he would take care to eject them. He claimed that the Government had that power and

I presume

I presume it had. The inhabitants resolved they would evacuate. The mines in the Crows Nest were operating very vigorously at the time, and they undertook to take all miners and give them work at once at Fernie, Michel and some other points on the Crow. The Canadian Pacific Railway volunteered free transportation and sent two long trains of empty box cars and backed them into Frank. Each family was allotted a car if they had household goods enough to fill it, or in some cases two or more families took a car. They then commenced to carryout their goods and load up the train, and it was incredible the short space of time it required to practionally load up all the people and their household goods. I think I am within the mark when I say that within two hours of the time the train was there ready to load 75% of the people had their household goods loaded and were seated in the cars ready to move. Some two or three, however, concluded they would take the chance and stay, and the Government never insisted on their going.

My recollection is the number of people who lost their lives was between eighty and ninety. I am speaking now from memory. Some marvellous things occurred. There was one family named Leach, of which the whole family were wiped out except two small children about eight or ten years of age, who happened to be sleeping in the upper room of the house close to the roof, and they were found in the afternoon following the slide still in the roof of the house. The balance of the house had been covered up by the rock but the roof had been carried a good many rods and left on top of the slide, and these children were still there unhurt.

There was a railway contracting party occupying a tent there, I think there were seven in the party. It was estimated they were covered with rock seventy-five feet in depth. The engineer who was connected with the party, and used to lay out the work, the party being engaged building the railroad up Gold Creek to the Grassy Mountain Mine, was down in Macleod, and had he kept sober would probably have been home and in the tent at the time of the disaster.

The day

The day after the disaster it snowed quite a bit, which melted on this rock which had come down on the slide, as much of it was still warm from friction, and the snow combined with the fine dust formed a mixture that was almost as slippery as soft soap, and it was utterly impossible while that condition lasted to walk over the slide.

There were very many peculiar things in connection with this slide, which I have no doubt you have noticed, and it is hardly worth adding to this paper, viz. the direction the slide took in certain places. Portions of the slide had its course deflected to the extent of nearly 180 degrees from the genetal direction of the slide, and another peculiarity was, you would find the moss and other vegetable growth on the rock just as it had stood on the top of the mountain, showing that the rocks in this slide had not turned over, the rock had come down in the same position it started. Another thing was that at the toe of the slide in many places you would see rocks that were up to a cubic yard in content that were thrown from 50 to 150 feet ahead of the balance of the slide. These rocks had been riding on the top and when the slide grounded their inertia carried them ahead. The best explanation of how the slide acted is to take a pack of cards and throw them down sharply on a table away from you, and you will find that the top cards go the furthest. That explains, I think, exactly the action that took place in this slide.

The Department at Ottawa, were very anxious to get details, and I was requested to telegraph full particulars. I sent one message early in the morning which it occurred to me contained sufficiently full details, and immediately got a reply to send fuller details. I then sent what I thought was a very long message. I then received a request to send still further details. I sat down and wrote a report, which at press rates, came to $54.00. I did not get any further request, but was told by a fellow official of the Department that the Deputy Minister made the observation that I was rather reckless in telegraphic expenditure.

One peculiar

One peculiar incident occurred in connection with the discussion over the cause of the disaster. An Irishman, named I think McCarthy, who was the head of the mining in the Gibault Mine, stated that the mountain came down because it became its time to fall, and he illustrated by an incident which occurred in his own experience. He said in the early days of the construction of the Canadian Pacific Railway across what was known as Julius muskeg, which was on the main line of the C. P. R. a short distance west of Whitemouth and which at the time was considered rather a formidable piece of work, getting a good road bed across it, and he was one of the contractors for making the dump across it. It was made in the winter time, they cut out the side ditches with hay knives, in chunks, and then took out those chunks with large manure forks, threw them on wheel-barrows and they were wheeled into the dump. One night when quitting work he stuck his fork in the soil on the bank of the ditch, and when he came across in the morning, just as he was stretching out his hand to take the fork it fell down. The time for it to fall had arrived, and it fell.

This said Mine was only operating one shift in twenty-four hours. There was sufficient open work, particularly as they were robbing, to furnish all the coal that could be disposed of, and further, as the mine proprietors were extremely anxious to show very cheap cost of mining, under the conditions then existing working only one shaft cost less per ton than working two or three. When the mine was not being worked a party of eight or ten men went through the mine to examine it and see that the ventilation was all right, do any necessary repairs, or additional propping that was necessary. This party was in the mine when the slide took place. They were fortunately under the leadership of a very intelligent North of England or Scotch miner, I cannot recall his name. They knew that something had happened and they attempted to come out at the addit and found it was choked with stone. They then went back to the first ventilation shaft, some 200 or 300 feet from the addit and found the upper part of it had been taken away and the remainder filled with rock. They then went back some several hundred feet, I think about 2000, where there was a large room worked out and on top of it a ventilation shaft running up to the surface, and on reaching that they found the walls of the seam had come so close together that they abandoned the attempt to get out that way. They then came back to the first ventilating shaft mentioned, and the horse stable in which there were some half dozen horses, was close to this shaft. The leader had the horses moved back into the pit for some distance so as to keep the air as pure as possible where they were working. They then started to remove the stone that had come down in this shaft, and about four o'clock in the afternoon, much to the surprise of everybody in Frank, they came out from this ventilating shaft on to the top of the slide.

Another interesting thing about that was, that the horses there had plenty of water but very little feed, but it was not, I think, till some thirty odd days after the disaster occurred that they got it opened up and could get in to the horses. They found them all dead except one, but after bringing him out into the air it was only a few minutes before he died. They had eaten up all their mangers and feed boxes, which were composed of heavy 3" spruce planks.

The greater portion of the miners at this point were Slavs, rather ignorant, but had a great passion for the burial of their relatives, and one of the chief agitations going on there was that the Government should at once engage a very considerable number of men so as to recover the bodies of those killed by the disaster, which was caused by the houses in which these miners were living being demolished by the slide. (I might mention that about some fifteen or twenty houses in all were destroyed in the village by the slide, possibly more). It was a foolish agitation because no one could be more effectually buried than under that slide, - might as well leave them there. However, they were prodding around trying to recover some bodies, and quite a party spent half a day and thought they had hold of a human body, and when they had the rock half removed discovered it was the hind leg of a horse they had been digging out.

Yours truly,

sgd. Wm. Pearce.

# Appendix 3

## University of Albera Archives

August 12th.1903.

My dear Colonel;-

As a matter of interest I would like you to know the following;-

Last week I took my wife and daughters down to see the Frank slide and when there I met Mr.Gebo,Manager of the mines,who made to me this statement and offered to take me through the old workings to verify for myself the truth thereof. To do so would have taken more time than I had at my disposal,but I have written to the Provincial authorities urging that their ~~minesxhaxdatxilx miningxengineer~~ mining surveyor be instructed to make a very close survey of the whole thing and determine ~~or otherwise~~ the truth of Mr.Gebo's assertion.

His assertions are that outside of the carrying away of the mouth of the tunnel and the filling up of the air shutes and man holes and the loosening of a comparitively small body of coal by reason of the rock slide,the workings of the mine are in a position identical with what theywere previons to the slide,and that as soon as he can get the workings in order at the mouth,viz; railway sidings, he will be able to put out as much coal as ever he did,namely,100 tons in 24 hours, and within 30 days 500,and within 60 days, one thousand tons.

In short the sand formation up to where the seam

has

Colobel R.J.Taylor,
228 Craig Street,
PITTSBURG.

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has outcrop, has not been disturbed in the slightest, if the sand stones have been cut at all it is above where this seam comes out between that and the lime stone contact]

If Mr. Gebo's assertions are correct then the mining operations carried on there, are not in the slightest the cause of the disaster. If such be the case it is highly desirable that the facts should be known, and if the movement has been wholly, in the ~~mine~~ then I think it follows that the balance of the town of Frank should be moved, because if the lime stones have moved there they may move further north and bury the town of Frank.

It is all very well to say that by watching the fissures will shew any signs of a further slide in sufficient time to enable parties to remove from the scene of danger, but I fear one or two things may occur, either carelessness in watching this mountain, or there may be no visible signs of any such movement, if so, the fissures may not come to the surface, or if they do come may be covered with moss, loose ~~or~~ stone, or gravel and not wide enough to be readily discerned. However, there are many people who think and assert that there must have been fissures indicating the last slide, but in that contention. I do not concur.

If the result of the examination bears out Mr. Gebo's ~~statement~~ assertion, then it will be incumbent on me to write to the Engineering News and correct my statement, ofr for

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for there is no doubt that the conclusion to be derived from my account was that the mining operations were chiefly, if not wholly the cause of the disaster.

Trusting that you will have a favourable moose hunt,

Believe me, my dear Colonel,
Yours very truly,

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# Appendix 4

## Geological Survey of Canada

cubic yards per day. One dredge of the "Risdon" type, by actual measurement, averaged over 1000 cubic yards per day for a whole year including days when laid up for repairs; this gives 20 cubic yards per H.P. average, instead of only 12 and makes the cost 1.34 pence instead of 2.03 as stated by Mr. Montague. Seeing that Mr. Montague is so inaccurate in some of his figures his statement that the cost of operating the "American" type is only 1.04 pence must be accepted with caution.

In saving fine gold it is generally admitted that the sluice box type of gold saver, exemplified by Mr. Montague's "American" dredge is vastly inferior to the "Risdon" type. It may be interesting to your readers to know that the first "American" type of dredge erected in Oroville proved a failure, and that it has now been altered to more nearly resemble the "Risdon" type. The dredges now built by the original manufacturers of the "American" type have few of their original characteristics, and are every year becoming more like the "Risdon" dredge.

In mentioning the three "American" type dredges in the Boise Basin, Mr. Montague omitted to state that the Boise has been altered by the Risdon Iron Works, and since then has been a success.

Mr. Montague is undoubtedly correct in stating that the close connected bucket dredges as now built, all dig more than they can properly wash and handle. The dredging industry is rapidly coming to the fore as a safe and profitable investment, and knowing that an influential paper such as yours wishes to put only reliable information before its readers is my reason for writing the above.

I am, yours truly,

R. H. POSTLETHWAITE.

SAN FRANCISCO, 15th May, 1903.

## The Frank Disaster.

Within 14 miles of the summit of the Crows Nest Pass, Canadian Pacific Railway, nestles the little town of Frank. The cause which gave rise to its existence may have been a tributary cause of the desolation that presents itself to the eye of the observer now. Coal has been known to exist in this district for many years past, but not till the magnificent prospects of the Crows Nest Pass Coal Co., Fernie, B.C., attracted public attention did the prospector's eye turn to the eastern side of the coal basin. It is now a little over two years since the vertical coal seam at Frank was located, and from that time till now, work has been vigorously carried on by a progressive company until the output had reached 1000 tons in one day. The coal seam, 12 feet thick, is nearly vertical, with a sandstone wall on one side and hard shales on the other. The seam follows the trend of the mountain in a south-easterly direction, the main gangway having been driven 5,600 feet with workings all the way into the face. The system of working is a combination of pillar and stall and long-wall work, the surplus coal only being taken from the chutes. The coal had all been loosened to the surface for about 3000 feet from the entrance and was ready to be drawn when the disaster happened.

The mountain which overlies the cretaceous coal measures is a carboniferous limestone and towered to a height of 3,000 feet above the level of the valley. This mountain, or mountains, forms the first main range of the Rockies, and is termed the *Livingstone* Range, the particular peak above the town of Frank being called Turtle Mountain. About 4 a.m. on the 29th April night work was being carried on as usual and the siding had just been emptied of its load of coal by a C. P. R. train crew. The train had pulled out to the yard sidings at 4.10 a.m. when a fearful rumbling of the mountain was heard, and in the grey dawn of morning the only living souls who saw Turtle Mountain descend into the valley were the train crew of the C. P. R. The mountain fell, struck the river bed, and with the inertia gained by the millions of tons falling 3,000 feet it swept over the valley like a mighty wave carrying everything before it. As it travelled, it spread, and from a width of 4,000 feet falling out of the mountain, it formed a fan-shaped mass at the outside (1½ miles away) measuring over 8,000 feet. The area covered by this immense mass of limestone rock and a small portion of the cretaceous rocks where it broke, is over 900 acres. This area is covered to a depth of from 10 to 100 feet in height, across the whole valley, and reaches up to 400 feet on the mountain on the opposite side of the valley, 1½ miles away. The main line of the C. P. R. for 1¾ miles is wiped out of existence and covered over to a great depth. The Frank & Grassy Mountain Railroad is also wiped out for over a mile and filled up with debris.

At the time of the disaster there were working in the mine 19 men, and out of that number 17 were saved. The two lost being a driver and a trapper boy who, no doubt, were at the time out on the tipple, as there was a trip of empty cars standing near the mine mouth ready to go into the mine. The 17 men who were saved dug themselves out about 80 feet from the main entrance to the main tunnel. The information gained from them is that the mine is very little damaged, a few timbers only in the gangway having been broken. The first intimation they had of anything being wrong was a serging of the hanging wall, then a crushing and falling of coal all around them. They made their way towards the mouth of the main entrance but found it blocked, going back into the mine about 4,000 feet they attempted to ascend the air shaft but this exit was also blocked. Again making their way to the lower tunnel, or first opening of the mine, they found their exit blocked by the inrush of water from the river which had dammed back to a height of 40 feet above its original bed. Their only course now was to try and dig themselves out at the nearest point to the main entry where there was the least covering. This they accomplished in 14 hours after passing through 20 feet of coal and earth, then nine feet of limestone boulders. During all this day of the 29th men were braving the dangers of falling rock from the mountain trying to open out the main tunnel, but before this was completed the miners had saved themselves. The great loss of life was entirely confined to the outside. The rocks and mud completely wiping out all tipple work, machinery, &c., demolishing six cottages and a number of smaller shacks and tents, two rancher's houses and a railroad camp which was situated a mile and a quarter away from the base of the mountain. The total number of casualties as far as can be ascertained is 66, although there may be a few more Slavonians or Russian Poles who are not accounted for.

Some remarkable escapes were made by those living in the cottages that were demolished, one whole family coming out without a scratch, between mud and boulders, with scarcely a vestige of their home being left; another case where six of the family were killed and only three left to tell the tale without any harm coming to them. Incidents of bravery were numerous, especially notable being the seven miners who were trying to open out the main tunnel and save their fellow-workmen. Rocks from the mountain were falling all around them, and the general manager remarking that it was rather dangerous work, the only reply was "Damn it, there are fewer men here than what is inside," and on goes the brave work. One man whose brother was entombed in the mine made the attempt to cross the foot of the slide to reach the air shaft on the other side, but his daring act was in vain as the shaft was completely covered by debris. Another incident well worth remembering was the act of the operator and brakeman who crossed the slide not knowing what next might come, to flag the passenger train which was just about due. After all the excitement of the 24 hours following the disaster, the rocks were still falling from the mountain and this caused an uneasiness among the citizens left. A meeting was called and three (3) men were appointed to ascend the mountain, examine into the cause, and report the conditions if still dangerous. This arduous ascent was made on 2nd May, and the report made to the representatives of the Dominion and Territorial Governments, President of the Board of Trade, C. P. R. officials and Canadian and American Coal Co. officials. The report was such that Premier Haultain immediately issued a preemptory order for the town to be vacated. This was accordingly done, and on the evening of 2nd May there was not an inhabitant left in the town. The mountain has been examined every day since and the conclusions that will be arrived at on the 11th May will determine if it is safe to again occupy the town. The indications are that the town will once more be populated as the broken portion of the mountains yet to come down will do so by degrees and not endanger life or property.

The C. P. R. have decided to go ahead with the reconstruction of the two miles of road wiped out, and in the course of a month all should be running smoothly again. The coal company have decided to open up their property again by sinking a slope on the coal immediately behind the town. The only loss to them, although heavy, is confined to machinery, plant, and stoppage of shipping; the actual loss in coal is small and the property will, in the course of eight or ten months, be as large a producer as before the disaster. With all the sadness caused by the loss of life in such a disaster there is always a humorous side to it and this happens in the conclusions that have been drawn as to the cause of the slide.

The first impressions were that a volcano had started in the mountain, some going as far as to say that they saw the flames and smoke, even pointing out the lava flowing down the side of the mountain.

The next thing was that of an explosion in the mine but this was soon exploded by the colliers showing up through the limestone boulders.

Others again said it was an earthquake and it started right in the centre of the valley where they saw rocks tumbling around like nine-pins.

Another propounded the theory of the tail of a meteorite striking the mountain "biff" and down she goes.

The most improbable theory was the three elements, coal, lime and water, forming a great body of acetylene gas, and off it goes by some unknown cause, removing mountains. Others again mixed up their ideas between lime and limestone, water mixes with the lime, expanding, and down goes another mountain.

To give the real cause, however, is a matter of conjecture as there may be the two tributary causes combined or only one of these acting.

Some fissure in the mountain, with the warm opening days of spring and a hard night's frost, as it was, may have caused the movement alone, or the loosening of the coal in the mine with very little support on the lower side caused the overlying mass to break away. These alone, or combined, caused the great rock slide at Frank which has awakened the world.

FRANK B. SMITH, B.Sc., M.E.,
*Inspector of Mines.*

CALGARY, 7th May, 1903.

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The disaster which overwhelmed Frank is certainly the most weird and terrible one could think of. On the morning of the 29th, at about 4 a. m., a rock slide came down which covered with debris the whole width of the valley, and spread down along its length for a distance of nearly two miles, burying all and carrying all in its wild rush.

Turtle Mountain is about 2,000 feet higher than the flat or valley at its base. It overlooks, and one might say it towers above, Frank, standing bold and fearful as a sentinel.

Its slope is steeper towards the top, the last 1,000 feet having certainly an inclination of 60°. The formation is limestone, with a westerly dip of from 40° to 60°; in other words, the strata dip into the hill.

A look at the hill will now show a great gap or cavity. The portion which gave way would be represented by a mass of limestone at least 1,200 feet long by 1,000 wide, by 50 thick. This great mass, becoming detached in an instant, slid down with fearful velocity, carrying everything along with it, scooping out in its passage the boulders, filling the bottom of the valley and spreading these along its run, thus increasing, to a great extent, its destructive action.

This is easily proved by the fact that the outer edge of the debris is composed of more or less rounded sandstone boulders, while the actual rock slide is made up exclusively of limestone, and forms the centre.

The avalanche, as it came down, passed over the coal mine at Frank, buried up the main entry and all its communications with the surface. It carried away tipple, blacksmith shop, stable, six cottages belonging to the coal company, besides several shacks in the valley below the town. It covered about 1½ miles of the C. P. R. with a thickness of at least 100 feet of rock; also some ¾ of a mile of track belonging to the Frank and Grassy Mountain Railway, the property of the Lille Collieries, which operates a coal mine 4 miles up a tributary valley.

Under the slide are buried some 60 people, a great proportion of which are women and children, as all of the 6 cottages of the company were occupied. Among the missing are the few men at the tipple and loading cars. Very few of the bodies have so far been recovered.

At the time there were 19 men in the mine; two of them were near the mouth of the entry, and are missing. The other 17 were inside the mine.

These tell of a great shock and noise, a cracking and squeezing of timbers. Their first idea seemed to be that an explosion had occurred. They made straight for the mouth of the main entry, but found that caved in. They climbed up the rooms to some raise connecting with the surface; everything was blocked. They finally decided to make their way out through the outcrop coal. After digging some 50 feet they succeeding in reaching daylight 12 hours after the accident occurred.

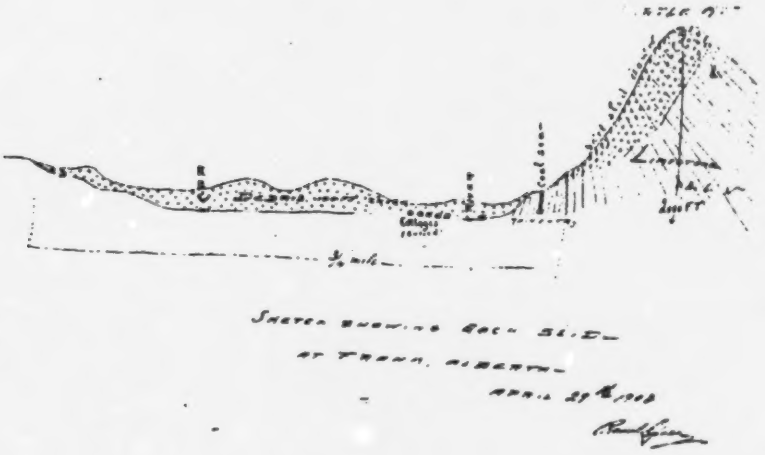
It happens that the seam where it outcrops along the side of Turtle Mountain is not covered by debris to any extent. The momentum of the mass of falling rock has carried it away and past the mine. The main entry itself, however, is deeply buried.

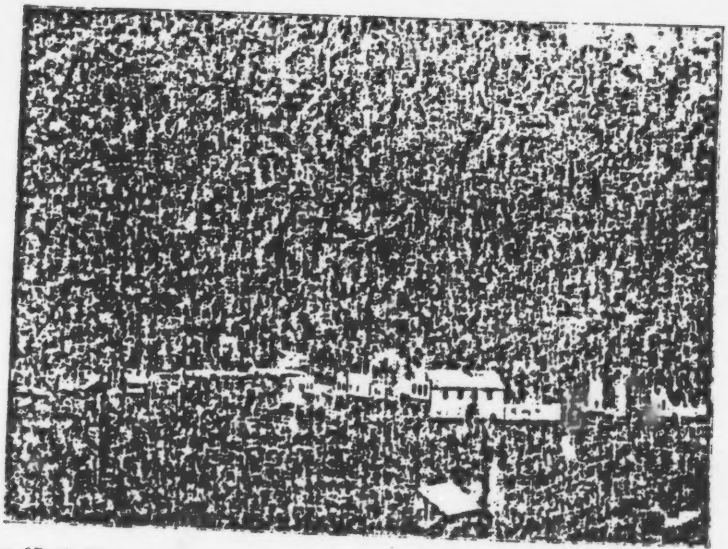
The blocking of the valley shut out all outlet for the river. It rose and formed a lake near the mine. Fortunately it has since found a channel, having reached the top of the debris, so all danger of flood is gone.

People awake at the time of the accident say there was a great noise, then a crash, accompanied by a trembling of the earth, as the mass of limestone slid into the valley beneath. Even at Lille Collieries, 4 miles distant, the shock was so great as to awaken everybody. All the following day rocks kept falling down in smaller masses. To-day, May 3rd, everything is quiet, but the danger, according to competent authorities, is far from past.

In order to ascertain the probability of any further sliding, a party was sent up to the summit of Turtle Mountain. This consisted of Mr. F. B. Smith, mine inspector; J. MacArthy, manager Frank

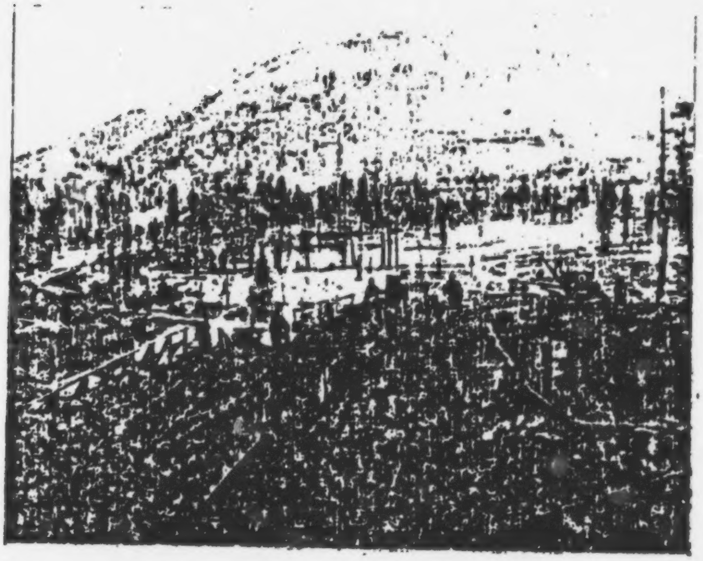
## THE FRANK DISASTER.





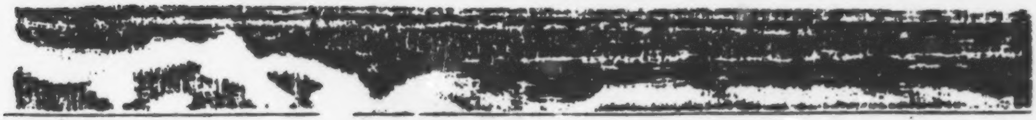
The Town of Frank, Alberta, showing location of Canadian-American Coal and Coke Company's Colliery before the disaster.

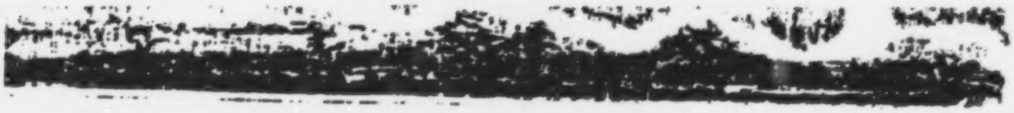
## THE FRANK DISASTER



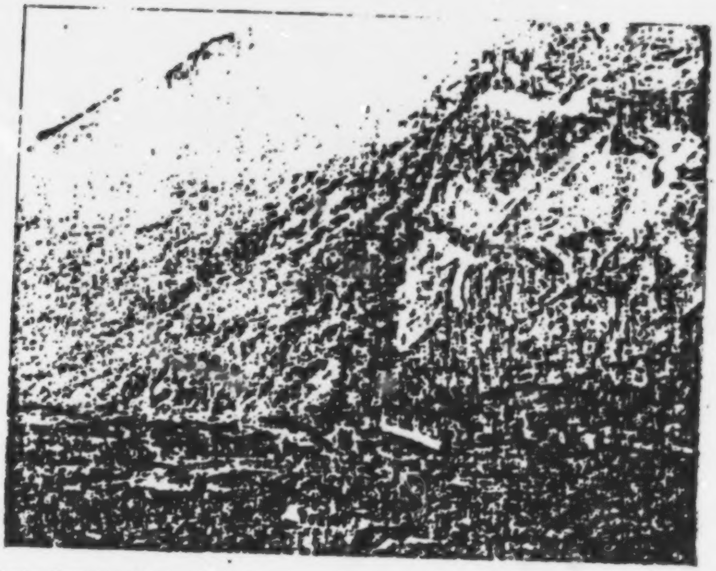
Showing Coal Chutes from mouth of the Colliery previous to the slide.

Showing Mine Entry, Railway, Coal Chutes, Coking Ovens, etc., before the disaster.





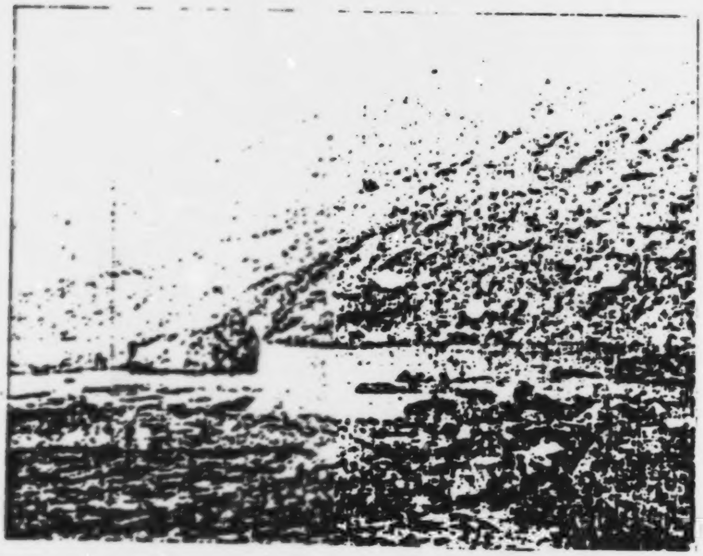
## THE FRANK DISASTER.



Showing Turtle Mountain after the slide, the lower end of the Town completely submerged in the mass of rock.

Showing remains of back row of cottages and foot of mountain where entry to mine was located. Two or three miles of country completely covered with a mass of rock in many places to a depth of two hundred feet or more.

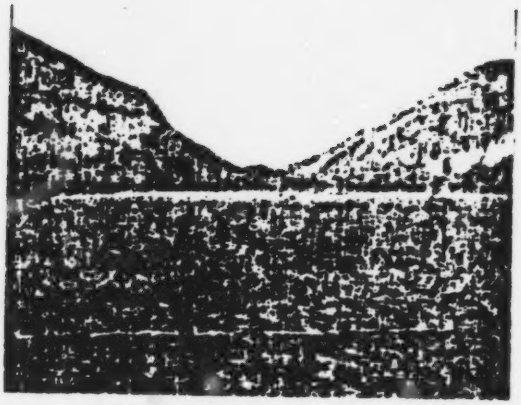
## THE FRANK DISASTER.



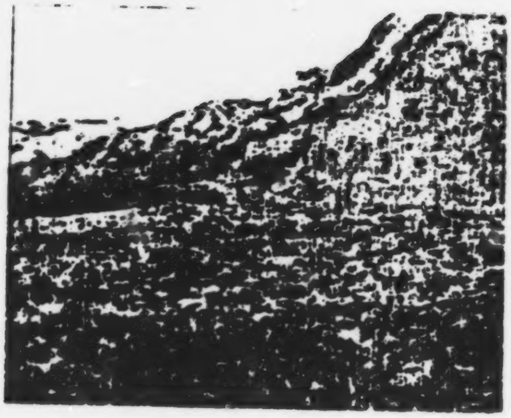
Another view of the mountain after the disaster. Old Man River filled with rock. X shows where the miners worked their way out after a whole day's digging. XX shows where rescue party endeavored to release them.

This view gives an excellent idea of the immense rock masses dislocated and hurled about one and a-half miles from mountain.

## THE FRANK DISASTER.



Picnic and Ball Grounds, Frank, Alberta. Taken in September, 1902, on the first anniversary of the opening of the town.



The same after the disaster.

## THE FRANK DISASTER.

General Manager McCarthy on top of the mountain examining into cause of continued rock falling.

Taken from the top of the mountain looking across the chasm.

Searching for bodies.

Mine (Canadian-American Coal and Coke Co.) and Mr F. L. Byron. They found the summit of Turtle Mountain fissured in all directions, particularly that part overlooking Frank. Some of the fissures were of unknown depth and over 20 feet wide. As a consequence, everybody was strongly advised to leave town. The state has provided transportation free to anybody who wishes to leave. The result is that to-night the town of Frank is deserted.

Right here let there be a word said of the hospital corps. Amidst all the confusion and excitement attending the removal of the wounded and maimed, they kept a self control that was remarkable and precious; of the miners and business men who toiled hard and patiently over the debris of their ruined cottages, hoping and fearing for their dear ones' sake.

Traffic is completely blocked from the east. It will be at least two months before the C. P. R. can lay down a temporary track, and a great deal more before everything is in good running order.

As to the future of the Frank mines, no one can exactly tell. There is no positive evidence as to their condition. The men that were inside at the time say there was cracking of timbers and some fall of rock, but as all of them were nearly in the same part of the mine, their evidence is not one to be greatly relied upon.

There is no doubt there has been some falling of rock and some squeezing of the walls; in fact, the very movement of the walls was probably the primary cause of the accident, as will be explained later, though what the extent of the movement is nobody can at present vouchsafe.

All sorts of theories have been advanced as to the cause of the slide. That limestone mass fell down either because of natural disintegration at its base, until insufficient support was left for the great mass above, or because an empty space having been formed underneath it by the mining out of the coal, subsidence of the roof occurred, loosening and starting the superimposed strata. The last represents exactly the conditions obtaining at the mine. (See sketch.)

Here we have a vertical seam 12 feet to 16 feet wide, approximately parallel to the general stratification of the limestone in the hill above it; rooms averaging at least 100 feet long, running up the pitch to the outcrop, with 20 feet pillars between. At first the coal was allowed to stay in the rooms, keeping them full, the surplus only being drawn out, but lately a considerable number of old rooms have been partly emptied. As has been said before, nobody is yet in a position to assert there has been a general subsidence of the walls. This point cannot be settled until an examination of the mine is made. In any case the catastrophe involves large losses, both in life and property.

The mine was shipping on an average about 600 tons per day. The coal was conceded to be of excellent steaming quality. It could be mined exceedingly cheap, rather less than $1.00 per ton, and found a ready market with the C. P. R. Whether an effort will be made to re-open the mine or not is unknown at this date. Other mines in the immediate vicinity are nearing the producing stage, and will be in a position to supply the demand for coal, which is rapidly making itself felt in the neighborhood.

RAOUL GREEN.

FRANK, ALTA., 11th May, 1903.

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Mr. J. Obalski, Inspector of Mines, has issued his annual report reviewing the progress of mining in the Province of Quebec during the year 1902. Mr. Obalski very conservatively estimates the value of the mineral production during that period at $3,000,000. About 5,000 persons are employed by this industry. Much serviceable information is given by Mr. Obalski concerning the asbestos, mica, chromite, graphite, copper and other working mines.

## EN PASSAN

In view of the very regrettable aband
visit of the American Institute of Mining Engin
bia, the Canadian Mining Institute is endeavour
engineers to visit Toronto early next year. In
meeting of both organizations will be held and
to the nickel, copper, iron and gold mining reg
into effect.

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In this issue we reproduce the two very fine
asbestos mining in Asiatic Russia. Mr. H. C.
neer of the Union Asbestos Mines, Black Lake,
indebted for these photographs, gives the follow
industry which, to some extent, competes with ou
duction in the Province of Quebec :—" The views
and "Baron Girar de Sonkamon" Asbestos Mine
Russia. These mines are remarkable for the la
production of 1500 to 1700 tons of asbestos per
work is all done without the aid of machinery
rock is essentially a serpentine, but is quite decom
of about 45 feet, so that it resembles a clayey
carries more asbestos to a given area than our
the veins are not so heavy nor of so white a
Again, our veins generally appear as "twin veins
veins are only single veins. Mining operations
upon very antiquated systems, while proper millin
does not exist. Experiments in milling are, howe
are very vivid reminders of what occurred at the
ago. The working force at these mines number
the season (*i.e.* each mine) and is recruited fro
or peasants. The wages paid ordinary lab
a day, with free sleeping quarters. These mines
scarcity of labour during the harvesting time, som
miners do. Adjacent lakes will prevent these mines
the depths of our mines owing to the very presen
—the lakes being on nearly the same level as the

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The announcement by the Finance Minister th
has removed the duties on mining machinery goin
and Atlin will be received with satisfaction by th
somewhat remote but important mining regions of

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Dr. Eugene Haanel, Superintendent of Mines,
annual report of the Minister of the Interior, an ex
and valuable review of the progress of mining in t
heartily commend to those of our readers who ar
productive gold territory. After very fully descr
mines which he inspected last summer and commen
proved methods of mining which are gradually sup
workings, Dr. Haanel concludes :—The first work
of Bonanza and Eldorado creeks by the crudes
years have been so wasteful that it has been fou
them a second time, and some claims have yielded
ing larger returns than on first working. Many of
now worked out 'from end to end and side to
nothing else than dumping ground.' No claims
as far as I could ascertain, are being worked a seco
likely that it would prove profitable to re-work them,
of extracting the gold have greatly improved, and ca
get out maximum percentage of the 'pay.' It must

ae. In further discussing this sub-
irect attention to two lines of evi-
nnected with the temperature of
other with the nature of the ac-
aoes.

o Dolter the lava of Vesuvius be-
a temperature of 1,090°; the mol-
ted in 1871 contained crystals of
· melting point is 1,310°. These
1,090° and 1,310°—represent three-
mum and minimum of heat within
but it may safely be assumed that
e of the boiling lava did not much
for the walls of the crater formed
ck showed no indications of fusion.
conditions we may venture to ex-
e that the ascending gases were
heat and caused the fusion of the
are supported in this view by
ances, such as the heavy deton-
accompany violent volcanic erup-
h must be regarded as due to the
nation of steam upon its entrance
gions. During such outbreaks the
dually become more frequent un-
louds of steam appear, which are
iling lava mixed with steam. At
steam ejected by Vesuvius must
a zone whose temperature equaled or
melting point of most rocks, and
herefore have originated from ea-
m.

portant gases ejected by volcanoes
rine, sulphurous gases and carbon
which show some regularity in
ce. Fumaroles, so far as they
vestigated, are accompanied by
test ones being dry. In those of
high temperature chlorine com-
ll as fluorine, boron and phos-
and. With a fall in the tempera-
ments become less important, but
ten arsenic are still found in the
ile carbon dioxide, which is pres-
ttest fumaroles, is emitted even
e become quite cool. Occasional-
ts in the same region exhibit dif-
of eruption. In 1901 the principal
ius ejected clouds of steam which
ed by hydrochloric acid, while the
f from the smaller vents along
e cone was free from acids or at
l only small quantities. In the
is there are steam, arsenic and sul-

ejected by volcanoes cannot be
e infiltration. Both the steam and
xide have their origin in the re-
f the earth; they give proof of the
· of gas from this planet—a pro-
een going on since the first for-
ust, and which has not yet ceased.
the entire hydrosphere have been
way, and we must recognize that
not dependent upon the infiltra-
ter, but, on the other hand, the
s volume with each eruption. This
s, it is inseparable from our con-
earliest phases of the formation of
French geologists seem to have
o give it support, but it has since
d by Tschermak and many others.
ence in support of this view is
mmonly observed phenomenon of
ee hydrogen from volcanic vents.
conclusions, we are prepared to
of Sainte-Claire Deville that the
lcanoes are places where oxida-
re carried out, and that the great-
e chemical compounds occurring
olcanic products have their origin
. Just as with hydrochloric acid,
and similar compounds, the water
upper part of the volcanic chim-

ney; and in this way the vadose waters of the earth's surface are increased by new supplies of what may be called *juvenile* water. In the same manner juvenile carbon dioxide, juvenile sodium chloride and other compounds come into existence, and here possibly lies the explanation for the fact that the hottest fumaroles are dry.

We may now inquire whether eruptive springs carry vadose or juvenile water. That such springs occur only in regions of recent vulcanism is well known. In Iceland the connection between the hot sulphur and alkaline springs, as well as the pulsating eruptive springs, and volcanic eruptions is so close that there is no reason for doubting the identity of the two classes of phenomena. As to Yellowstone Park, where there are 100 geysers and thousands of hot springs, I call attention to two facts: First, that sulphur and arsenic are deposited by certain springs which could not have derived these elements by leaching of the rock formations; secondly, that the activity of all of these springs has been subsiding for more than a year, without any relation apparently to the rainfall.

The hot springs of Iceland are the natural result of the cooling of a buried lava-mass, the emanations from which are too weak to cause a volcanic outburst, or they may represent the initial stages of an eruption. It is quite possible that vadose waters are caught up and carried to the surface by the springs, but their circulation downward ceases when they come in contact with the hot waters from below. It is also imaginable that under certain conditions, such as a decrease in the volume of ascending gases, the vadose infiltrations will penetrate to greater depths and with a renewal of activity they may form a considerable proportion of the outflow. But in any case the contributions from vadose sources play a subordinate role; the essential principle of the hot springs rests upon the ascension of juvenile materials, the "support interne."

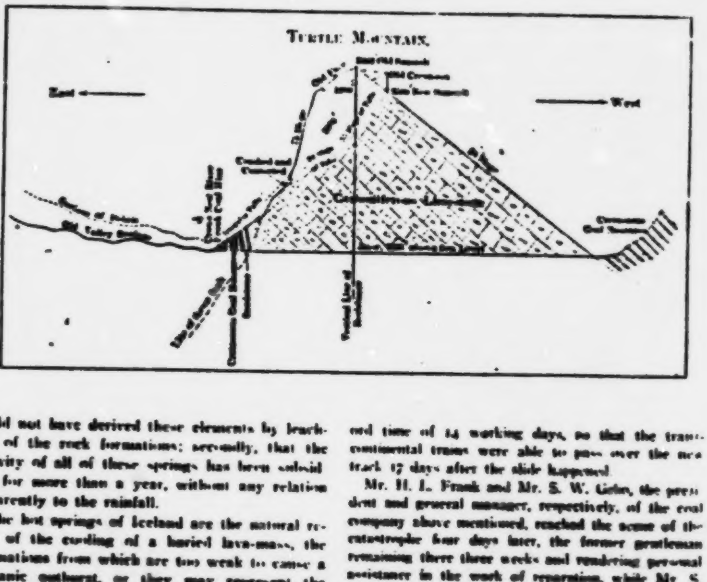
*(To be Continued.)*

**ELECTRIC HOISTS.**—Recently at a small colliery, near St. Helens, England, a hoisting engine was put up to be operated by electricity furnished by the lighting plant of the corporation. The hoist was a small one, the depth of the shaft being about 200 ft., and the amount of coal raised daily 70 tons only. About the same time, another small colliery was started with a steam-hoisting engine. The quantity of coal raised was about the same, but the depth of the shaft was about 240 ft. A comparison of the costs of the two engines showed the cost of the electric hoisting per ton of coal raised was only about one-third of that of the steam hoist.

## THE TURTLE MOUNTAIN ROCK SLIDE.

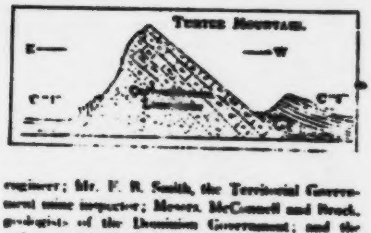
By [illegible] E. [illegible].*

The center and highest peak of Turtle Mountain at Frank, in Alberta, Canada, fell away on April last, and shot down the mountain side, passing over the foothills which contain the coal measures. It spread out in broken fragments over the valley below, so as to cover 7,000 ft. of the Canadian Pacific Railway Company's track, with loss to life and property. Shortly afterward Mr. A. E. Springs, director of the Canadian American Coal & Coke Company, visited the top of Turtle Mountain, and reported that he considered it quite safe for the inhabitants of the town to remain. The engineers of the Canadian Pacific Railway concurred in this opinion. They commenced to rebuild that portion of the track which had been destroyed, this being successfully accomplished under the superintendence of Mr. Taylor, the division superintendent, in the ced time of 14 working days, so that the transcontinental trains were able to pass over the new track 17 days after the slide happened.



Mr. H. L. Frank and Mr. S. W. Gebo, the president and general manager, respectively, of the coal company above mentioned, reached the scene of the catastrophe four days later, the former gentleman remaining there three weeks and rendering personal assistance in the work of reparation, while Mr. S. W. Gebo started the re-opening and development of the mine on a large scale.

Examinations of the mountain were at once commenced by Mr. Ellerot, the Territorial Government engineer; Mr. F. B. Smith, the Territorial Government mine inspector; Messrs. McConnell and Brock, geologists of the Dominion Government; and the writer, on behalf of the Canadian American Coal & Coke Company.



Turtle Mountain might be described as a freak in rock upheavals, with phenomenal conditions highly conducive to a weakening process, both chemical and mechanical. It is a narrow ridge of Carboniferous limestone, that has been forced up and through the overlying Cretaceous coal measures like a wedge, the thin end of which has crumbled and broken by disintegration, for 2,500 ft. at the center, into three peaks, the highest and center one standing

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[*] Consulting Engineer to the Canadian American Coal & Coke Company, Limited.

Sufficient evidence has been deduced from the foregoing to show that the mining operations at Frank bear no relation whatever to the rock slide, but it will be well to draw attention (in view of so many public statements having been made that a creep in the mine was the probable cause) to a feature of the rock structure, hitherto apparently overlooked or disregarded, which offers still better evidence, if such is possible; and proves, even if the sandstone walls of the coal seam now being worked are allowed to come together by the entire extraction of the coal, that the weakening effect on Turtle Mountain would be inappreciable. Turtle Mountain is composed of limestone, of Carboniferous age, and therefore, its original position was below that of the Cretaceous sandstone, shales, coals, etc. Both formations are of sedimentary origin, deposited one upon the other, in horizontal layers. The mass has been uplifted by pressure from below and tilted into the position observed to-day, as illustrated by the vertical section B. This shows that the Cretaceous rocks, directly overlying the limestone, at and about the central area of disturbance were badly shattered and crumbled and then eroded, leaving the limestone exposed in the position of an extruding wedge, with the Cretaceous series overlying it at contorted angles, near to the point of disturbance, but gradually resuming their horizontal position on either side as distance is gained from the point of uplift. Therefore, if the Cretaceous rocks, at points marked C 1 and C 2 on section B, were entirely removed by mining operations, the limestone intrusion of Turtle Mountain would not be affected thereby, and would stand precisely on the same base as it stands to-day.

So many public statements have been made as to the danger that overhangs Frank and its inhabitants from further rock slides, that it is considered advisable to say that careful surveys and examinations have been made of the remaining peaks, and biweekly observations are being taken, so as to detect any creeping movement that might take place, and, in the meantime, all dwellings that are within the possible danger zone, are being removed to a point absolutely safe, three-quarters of a mile from their present position.

The writer examined the top of Turtle Mountain five times during a three weeks' stay at Frank, and placed twelve reference cement mounds at points where movements can be readily detected. During that time there was no shifting whatever. The crevices now existing on what is termed the North Shoulder are exceedingly small, affecting an area equal to scarcely one-tenth of the tonnage that has already fallen. They also distinctly show that they are quite new, and the result of the wrenching and tearing away of the larger mass; while, therefore, it is improbable that any movement will be detected for some years to come, nevertheless, by the system of measurements and observations now in force, the greatest possible insurance against danger is now obtained.

The coal company resumed operations a few days after the slide, on the work of repair and the opening of the mine at two new points, 1,700 ft. and 5,780 ft., respectively, from the old opening, at which place it is considered absolutely safe, and out of any possible danger from further rock slides. The shipment of coal has been recommenced.

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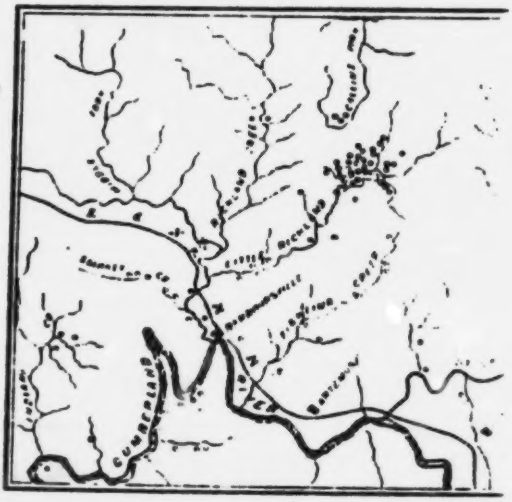
**THE HOEPFNER ELECTROLYTIC PATENTS.**—Formal notice is given that the patents on various electrolytic processes, issued to the late Dr. Carl Hoepfner, which have been owned since his death by his sister and heiress, Fraulein Anna Hoepfner, have been conveyed to the Gesellschaft fur Metallelectrolyse mit Beschrankter Haftung, whose office is at Siegen, Germany. The company gives notice that it is prepared to grant licenses to work under the patents named; the business being in the hands of Messrs. Hugo Steinmeister and Gustav Menne in Siegen.

## THE BARBOURSVILLE OIL-FIELD, KENTUCKY

By S. W. McCallie.*

The Barboursville oil-field is situated in the extreme southeastern corner of Kentucky, only a short distance from the Kentucky-Tennessee State line. The most productive part of the field is found along the several tributaries of the Cumberland River, in the vicinity of Barboursville, the county site of Knox County. Physiographically considered, the oil-field may be said to be near the center of the Cumberland table-land, an elevated region noted for its extensive deposits of coal. In the vicinity of Barboursville, where the oil development has been vigorously prosecuted within the last few months, the Cumberland plateau loses its distinctive character. In this district the surface has been greatly changed by erosion so that the topography is now almost mountainous. The Cumberland River has cut a deep, narrow valley in the Carboniferous sandstones, while its tributaries have been actively at work eroding similar but minor valleys at right angles to this main valley. The combined effects of these several streams has given rise to a rough, broken region with hills and ridges often attaining an elevation of 300 or 400 ft. above the general stream level.

Oil has been known to exist in the Barboursville District for many years, but it is only within the last two years that there has been any serious prospecting. The first producing well to attract widespread attention was what is known as the Jones gusher, brought in on Christmas day, 1902.



This well is located on Little Richland Creek, about 6 miles northwest of Barboursville. When the oil sands were first struck, the oil was forced up with great violence, partially wrecking the drilling rig and spraying everything in the immediate vicinity. The well continued to flow for some time, but the pressure gradually diminished until the flow finally ceased.

The successful completion of this well was soon followed by that of others equally promising. Wells were also put down on Big Richland, Stinking, Stookey and Indian creeks, and most of them, although pumping wells, became producers of some importance.

At the time of the writer's visit to the district, about three weeks ago, the number of wells put down was estimated at 200, many of which were producing from 25 to 50 barrels of oil per day. The life of these wells cannot at present be determined with any degree of accuracy, owing to the short time the field has been opened up.

The total oil output of the Barboursville District

up to April 1 was al
tion at present is
it being purchased
which has erected
trict, and has exte
field.

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that of other port
The strata are not
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folds. In some
clinal folds seve
minor valleys, b
having a northea
ficult to determine
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Nevertheless, the
evidence concerni
problem.

The surface rock
stones and shales w
which are most th
been termed the L
the coal-bearing
sandstones are oft
coarse grained, p
shales are usually
good deal of iron
tions. Both the
plant remains, wh
series are approach.

The lowest p
appears to be one
minor valley from
stream level. Other
ous wells to a depth
they appear to be
sandstones and sha

The deeper forma
trict is revealed by
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herewith.

Deeper borings
is struck at a depth
limestone, as has
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logical position midw
the productive coal
a position correspon
and therefore sub-Co
nington shales.
Campbell, of the
in eastern Kentu

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* Assistant State Geologist, Atlanta, Ga.

fully 500 ft. above the North peak on one side and the South peak on the other.

Following along this ridge, from the north to the south, the horizontal distance is about three miles, and a vertical height gained, near the center, of 3,000 ft.; the perimeter along the west side is very irregular, while that along the east side is regular and clean cut, with a precipitous face, looking down upon the town of Frank, the coal mine and the railway.

The horizontal measurements through the base from east to west vary greatly; in many places it is 7,000 to 8,000 ft., while directly under the highest and central peak it is barely 4,000 ft.; the highest peak, rising abruptly 3,000 ft. above the town, stood on the summit line, scarcely 6,000 ft.

The accompanying vertical section of the highest peak of Turtle Mountain, taken on an east and west line, shows an angle of slope on the east face of 75°, for a length of 1,000 ft. or more. In approaching the base the slope is less steep. These angles of inclination follow the line of original fracture or thrust-fault, which marks the uplift of the body of limestone from its original horizontal bedding plane. The back or west face runs fairly uniformly at a slope of about 30°; this represents the true dip slope, that is, the inclination of the bedding of the limestone. It will also be noted that the rock structure gives the east face a somewhat overhanging appearance, with a block of the mountain behind it. This block contained an enormous tonnage, calculated at closely upon 80,000,000 tons. It stood upon an insufficient base and, therefore, exerted a greater crushing energy at the foot, and greater straining at the center of the mountain. These conditions account for two facts, namely, (1) The highly contorted and shattered condition of the limestone at the base of the precipitous east face; (2) the crevasses on the west face, several hundred feet back from the summit, which, it is now learned, existed some years ago. The rapid disintegration characteristic of limestone under extreme atmospheric conditions, made the third great factor which gradually, but surely, weakened the already unstable rock structure along its vulnerable lines of lamination, jointing planes and crevasses, until the strain became greater than the resistance, and, at 4:10 a. m. on April 29, 1903, culminated in an awful calamity.

The dimensions of the peak that thus broke away are about 2,000 ft. across the face at the longest point, about 2,000 ft. greatest vertical height, and a greatest thickness of 1,000 ft.

From the top of the mountain to the extreme end of the debris, across the valley below, and 400 ft. up on this side, is about 1½ miles horizontally, and a vertical fall of about 3,000 ft.; the area covered by the debris is 1¼ square miles, and is of an average thickness of about 30 ft., while in some spots it is piled 100 ft. high.

It has been stated authoritatively, that the sudden tearing away of this enormous mountain peak might have been favored by the coal mining operations carried on at Frank. This, surely, though a careful and non-committal statement, was premature, as, at that time, no examination of the mine itself had been made. Since then, however, the main entry of the mine has been reopened, and the writer has made an inside examination, finding the workings absolutely intact. Various miners who were at work at widely separated points underground at the time of the slide, and who all found their way to the surface safely, have made certain affidavits stating that their first intimation of what was afterwards learned to be the slide, was a very loud rumbling noise, like the beating of drums, and this was followed by a great breath of air, which put out all their lights; then came the tumbling of small fragmentary limestone rocks and dirt down the narrow openings and manways that lead up to the surface. This told them precisely what had happened. They lit their lamps and ascended one of the manways, but found it blocked with fragments of limestone and dirt; they then descended to the lower level main entry and walked a mile to the mouth. They found this also blocked about 50 ft. from the entrance. This determined them to clear out the dirt at a manway near the mouth of the main entry, which was successfully accomplished, daylight being gained 13 hours after the slide took place, without the slightest injury to any of them. Just one month afterwards, the main entrance was re-opened, and a party of ten, including the superintendent, Mr. S. W. Gebo, Mr. A. [illegible], Mr. Bernard and the writer, went into the extreme end, and we found, as stated above, that the mine was in splendid condition, one of the horses being alive, after a fast of 31 days, which is remarkable testimony to the fact of there having been always a good circulation of air in the mine. Incidentally, it demonstrates the stability of the solid sandstone casings, which stood the tremendous pressure exerted by the impact of 80,000,000 tons of rock within a distance of [illegible] ft.

VIEW OF TURTLE MOUNTAIN, SHOWING SLIDE AND DEBRIS ACROSS VALLEY.

The old summit is shown by the faint lines; the mass in center shows portion of town.

TURTLE MOUNTAIN AND TOWN OF FRANK AFTER THE SLIDE.

# Appendix 5

## Public Archives of Canada

Letter No. ____________

Reference No. ____________

781175

OFFICE OF THE

Chief Inspector of Surveys,

*Calgary, Alberta,* May 5th, 1903.

DEPT OF THE INTERIOR
MAY 12 1903
REGISTRATION BRANCH
OTTAWA

Sir,-

I have just sent you the following telegram:-

"A large number representing all interests visited scene of slide at summit and slope of same yesterday. Result is the Railway has started vigorously to construct line across slide. The miners have volunteered to start and open the mine. Probably the citizens will re-occupy their buildings in Frank."

I think everything looks most re-assuring and I trust that anyfurther slides will not be serious. If,after I am able to start my party out connected with inspection and establishment of depots, which I hope to be able to affect within the next 48 hours, there appears to be any necessity of doing so, I may then visit the scene of the disaster and report fully to you as to how I find things then. I think I may have the time to spare to do that.

I am, sir,

Your obedient servant,

Wm Pearce

Chief Inspector of Surveys.

James A. Smart, Esq.,
Deputy Minister of Interior,
OTTAWA, ONT.

May I st. 1903.

The acting Director of the Geological Survey of Canada has just received from Mr. W.W.Leach B.A.Sc.,of the same Department, a telegram to the following effect ; [redacted]

The Frank disaster is simply a great rock slide, from near the top of Turtle Mountain. The area in the valley covered by the slide is about two miles square and fan-shaped in outline. The mass of rocks displaced varies in depth from ten to one hundred feet. Turtle Mountain is a compressed fold of anticlinal axis of Carboniferous limestone, dipping at a very high angle to the West, as shown on the Map accompanying my summary report for 1902, now in the Press.

M.D.

**Copy.**

C. P. R. Company's Telegraph.

6. Ra. Ac. Cd. S. I4-a

76. Collect Red. May 2nd.

Frank. N. W. T., May Ist 1903.

James A. Smart,
Ottawa.

Chief Engineer McHenry from observations taken to-day fears further rock slides from Turtle Mountain which may overwhelm many buildings in Frank Premier Haultain at public meeting to-night announced McHenry's views and arranged for special train to take those who wished to leave to towns to west where there might be accomodations many will leave to-night and remain for a few days awaiting developments everything going on quietly no excitement worth mentioning and not much drunkeness.

Sgd.( WM. Pearce.)

file

810972

Dept. of the Interior
Aug 18 1903
Ottawa

OFFICE OF THE

**Chief Inspector of Surveys,**

*Calgary, Alberta,* August 7th.1903.

file

S i r :-

Re Frank disaster, see your Reference 781175 779886 Sept 1/03

My dear Sir :-

In my official account regarding the Frank disaster, I intended to be careful in not stating what was the cause of same, however, any one reading between the lines if familiar with the conditions, would undoubtedly come to the conclusion (at least in my opinion) the disaster was caused by the mining operations carried on at that point.

This conclusion is emphasized from the fact at the request of the Engineering News of New York, I sent that publication also an account which was published in that journal on the 4th. June. The publication of that article has led to considerable correspondence from persons familiar with or interested in coal mining operations, and they have invariably concluded that the disaster was, also ~~contributed to~~ largely, if not wholly caused by the coal mining operations carried on at that point.

The official report of the Geological Department signed by Messrs. McConnell & Brock, state plainly that the coal mining operations were at least contributory to said disaster.

Desiring that my wife and daughters should see the scene of this disaster, last week I accompanied them

to Frank

James A. Smart, Esqr.,
Deputy Minister of the Interior,
Ottawa

810972

Letter No. ________________

Reference No. ________________

OFFICE OF THE

**Chief Inspector of Surveys,**

*Calgary, Alberta,* ________________

//"//

--2--

to Frank, and when there met Mr. Gebo, Manager, of the Frank Mines. In discussing the matter with him, he made certain assertions, which, if correct, prove beyond doubt that the mining operations had nothing whatever to do with the said slide, and he offered to take me through the old workings to demonstrate the truth of such assertions. But to make the examination necessary would have taken at least a day, and I had not the time at my disposal just then. I have, however written to the Hon. Mr. Haultain, under whose supervision the mines are, suggesting that a thorough survey be made of the old workings to determine or otherwise, the trust of Mr. Gebo's assertions, and I trust such will be done at an early date.

If his assertions prove correct, then it is only fair to the Coal Company to relieve them of any responsibility of said disaster, which might be attached to them by reason of reports or actions by Government officials or others. There is a very general belief that the said mining operations were largely the cause of the disaster.

This however, brings up another point. If the mining operations were not contributary in any way to the slide, is it not probable, at least possible, that further portions of that mountain to the North may come down and bury the balance or at least portions of the balance of the town of Frank ?

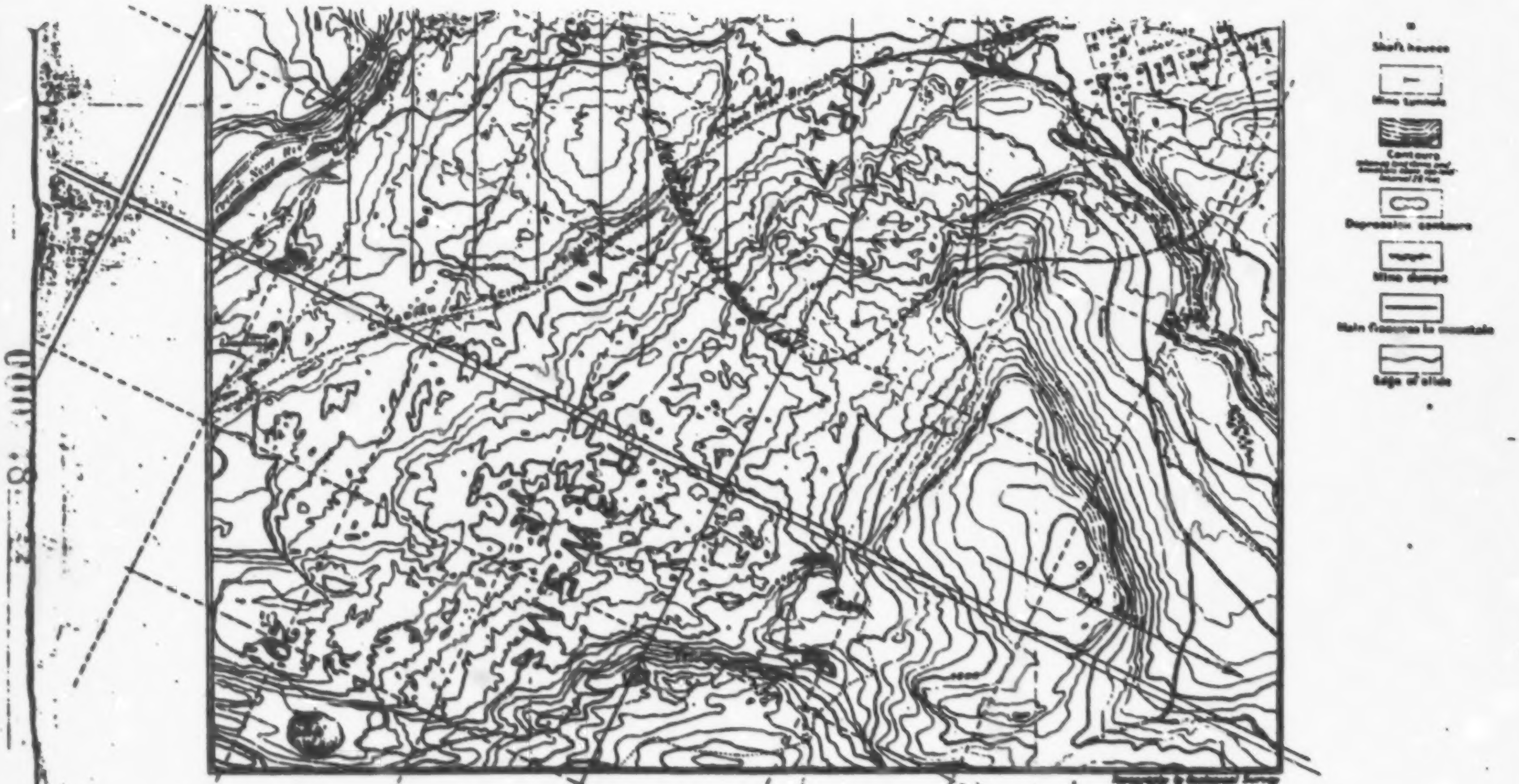
I have the honour to be,

Sir,

Your obedient servant,

Wm Pearce

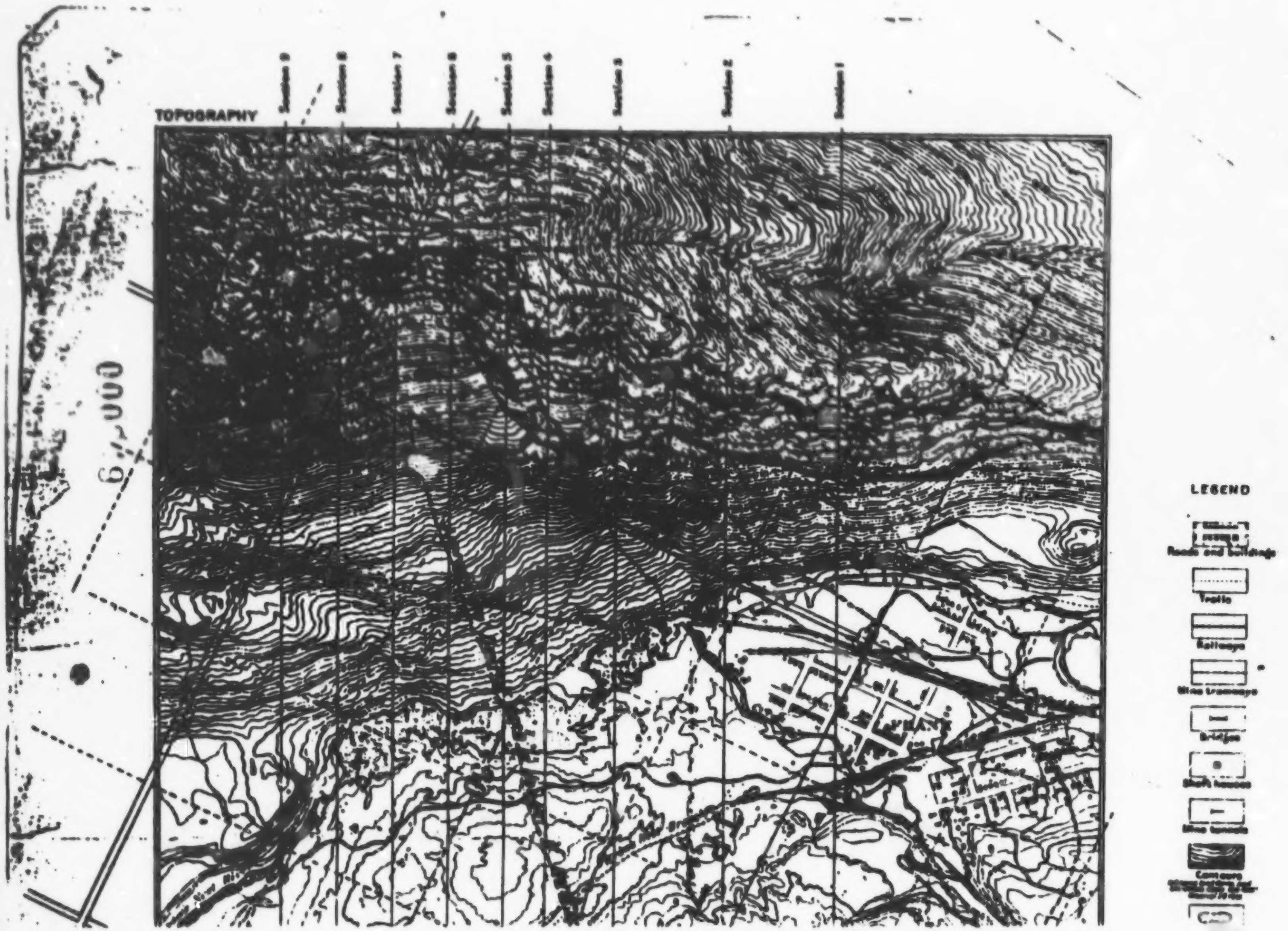
00[illegible]17

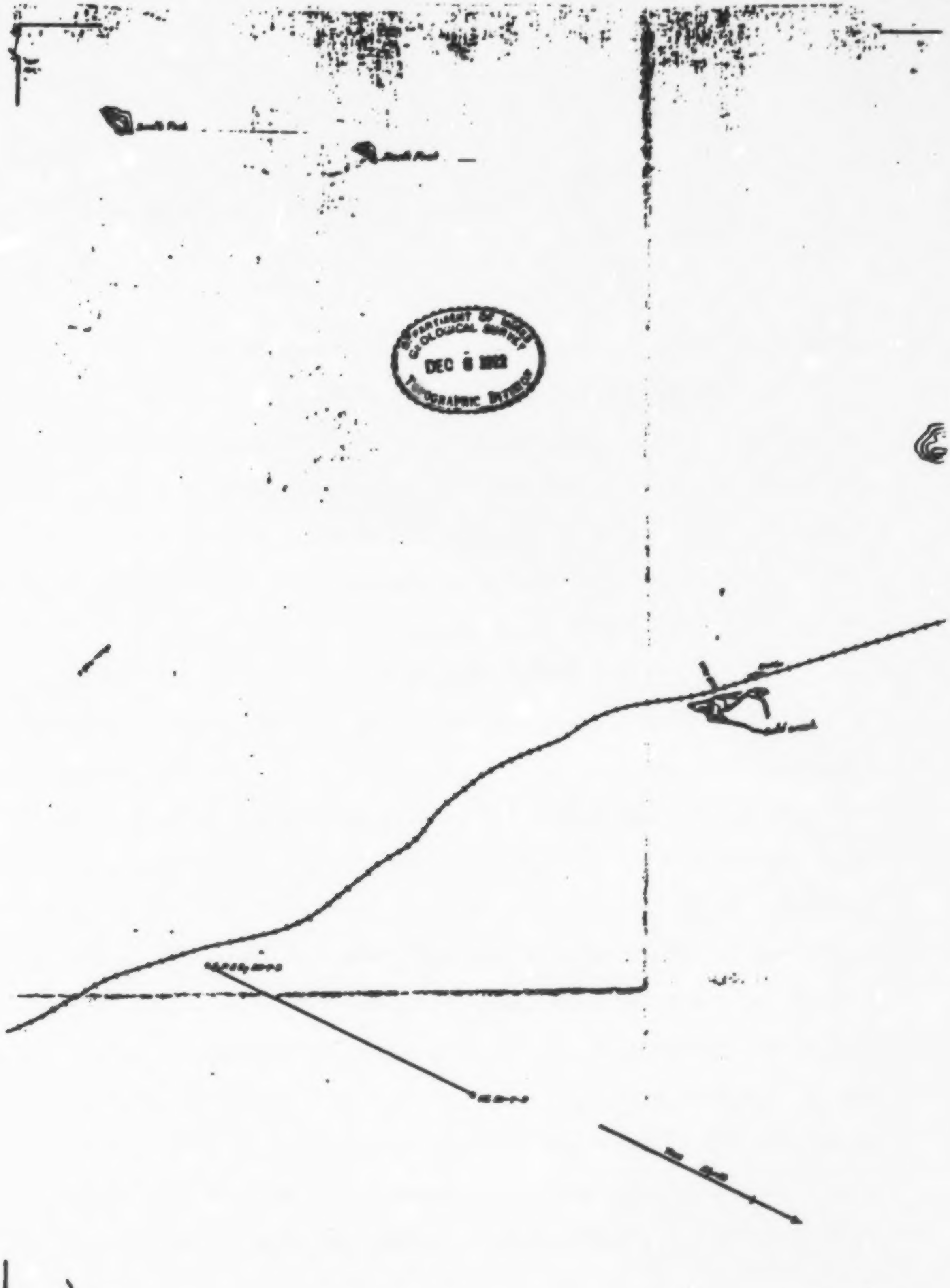


# TURTLE MOUNTAIN AND VICINITY
## ALBERTA

To accompany Report of the Commission appointed
to investigate the condition of Turtle Mountain, 1911

Scale, 800 feet to 1 inch
Feet


TOPOGRAPHY
Section 9
Section 8
Section 7
Section 6
Section 5
Section 4
Section 3
Section 2
Section 1
LEGEND
Roads and buildings
Trails
Railways
Mine tramways
Bridges
Shaft houses
Mine tunnels
Contours



DEPARTMENT OF [illegible] GEOLOGICAL SURVEY
DEC 6 [illegible]
TOPOGRAPHIC DIVISION

REFERENCE SHEET

showing D&S pads

Ottawa, July 20th, /11.

Dear Sir.

On my return to Ottawa I found your wire of the 6th inst., and also a letter from the Hon. Frank Oliver calling attention to the views of the citizens of Frank regarding the press despatch concerning Turtle Mt., and requesting that steps be taken to remove any possible misapprehension in the matter which to them is of such stupendous importance.

In reply I wired you yesterday as follows, "Globe article evidently founded on my report to Minister. Article somewhat stronger but correct in representing Survey opinion against disturbing base of mountain by mining. Am writing." I am informed that a copy of my report has been forwarded to you, so that you by this time know exactly what I did say. It is needless to remark that I did not give the despatch to the press, as you will notice that the wording of it is somewhat stronger and more picturesque than that used by me or that I would adopt, but it is sufficiently in accord with the sense of my report, and with the facts, to stand without correction, for it is unsafe to mine the coal below that north-west shoulder and peak and it should be stopped forthwith. Since the time I reported as one

of

of the Commissioners on the Frank disaster, I have continued to urge upon those interested the danger of undermining that particular area. In so doing I was voicing not my own opinion only but that of this Survey and of every other disinterested person qualified to express an opinion whom I have heard. The effect of such mining in disregard of the warnings is now to be seen on the shoulder of the mountain. In the face of present conditions, with the Company still insisting on the security of the mountain and apparently still resolved to continue mining, it is not right for one cognisant of the facts to remain silent or to minimise the danger that is being incurred. If we had authority to do so we would not hesitate to stop operations, but such action rests with the Local Government.

With regard to an investigation, I do not see what is to be gained except further time to mine coal which would render the condition of the mountain still more unsatisfactory. The Dominion Government appointed a Commission to investigate the mountain immediately after the slide. The findings were published in the Report of the Department of the Interior for the year 1902-03, and differed in no essential respect from all subsequent reports based on more recent examinations. The mountain has been examined by the Survey several times since; last fall I went over it in company with Mr. John Stirling, Provincial Inspector of Mines, and several

officers

officers of the Coal Co., a sufficiently representative party. Nor is it a matter that requires detailed investigation. It resolves itself into a very simple proposition concerning which there is little room for differences of opinion, except in the case of persons whose judgment is liable to be warped by financial considerations -- men mined under Turtle Mountain and brought down the entire block that lay above their workings. Now they are proceeding to do the same with regard to the north-west peak and shoulder. It is idle (where lives as well as property are jeopardized -- a harsher word might be used) to argue and to proceed on the assumption that what has occurred is impossible. The demonstration given on the morning of April 29th. 1903, is more reliable, more convincing, and more worthy of acceptance, than the report of any Commission of investigation could possibly be.

It appears to me we have done all we can in examining the mountain, and in calling the attention of the Company and the Provincial authorities and the public to the danger and to the necessity of stopping mining. If the Provincial Government, that has authority to act in such a matter, should not care to take so grave a step without additional justification and a Commission should be deemed advisable, it should be appointed by the Local Government, since they can enforce the findings of the Commission. The Dominion Government has not the authority to do this.

I

I trust you will believe that we have not expressed an opinion without grave consideration. It is something we would gladly have avoided. It was specially hard for us whose main function is to assist in the development of the country, and particularly in the development of mining, but where so much life as well as property is at stake it was a duty which we could not evade. If there is the slightest chance of mining bringing on a recurrence of the disaster of 1903 it should not be permitted, and unfortunately in the light of what occurred then it is impossible to contend that such a chance does n t exist, and it was our misfortune that it was left to us to say so.

If there is anything further that I can do towards protecting the lives and property of the citizens of your town please command me.

Yours respectfully,

R. W. Brock

Mr. Harvey Murphy,
Frank, Alta.

# TOWN OF FRANK IN GRAVE DANGER

## Landslide is Feared Owing to Recent Mining Operations.

## SOUNDS A WARNING

## Cracks Have Appeared in the Walls of the Rocks.

Ottawa, Ont., June 30.—That the Town of Frank, Alta., is in grave danger of a landslide, with heavy loss of life, owing to mining operations which have weakened the north-west shoulder of Turtle Mountain, is the gist of a report by Prof. R. W. Brock, director of the Geological Survey. Turtle Mountain, whose north-west shoulder overlooks Frank, has large coal seams at its base. Cracks have already appeared in the huge mass of rock, which are ascribed to the mining operations, and it is considered that any further work on the coal seam may lead to awful results.

Frank has already had one landslide, the catastrophe of 1903, and now Turtle Mountain is said to be hanging over it like a sword of Damocles.

The mountain has been under inspection since 1903 by the Geological Survey. Professor Brock reports it this year to be in much more dangerous condition than a year ago.

Last year two small cracks were tected. This Summer they are quite rked in development. Moreover, the surface is covered with shingle, so that a fissure might not be evident until it had attained considerable size. The report ends with an urgent warning that any further undermining may result in disaster without the slightest notice.

Ottawa, July 22nd, /11.

Dear Sir.

Your letter of the 17th inst., addressed to the Minister of the Interior has been transferred to me for attention. I am sending you a copy of the Summary Report, on p.13 of which is my report on Turtle Mountain which has evidently formed the base of the press despatch. As you will see from the report there is some danger from the north-west shoulder of Turtle Mt. If mining is proceeded with at the base of the mountain the danger will be grave and it is our opinion that the mining should be stopped. It should never have been started within the danger zone but now it should certainly cease.

Yours truly,

R. W. Brock

G. H. Balfour Esq..
General Manager,
Union Bank of Canada,
Quebec. Que.

Ottawa, May 12th., 1910.

Gentlemen,

The Department of Public Works, Edmonton, has forwarded to me your proposed plan of extracting the coal from the Great Seam and the Shaft seam below the northwest shoulder of Turtle Mountain and the old slide.

I have thought over the matter carefully and have submitted it to several geologists of the Survey and without exception, the opinion is expressed that it would be unsafe. I have indicated on the sketch map what is considered the danger zone. It is of course impossible to determine absolutely what the mountain will stand or the exact point at which operations should cease, but the point I have indicated is in our opinion the southerly limit of safety for extracting coal. It is I think, farther south than I should risk if it were my property.

There are two pronounced systems of joint planes which divide the rock mass, one about parallel to the axis of the shoulder and the other parallel to the observable fractures and the north ridge. It was along these that the Turtle Mountain broke away in the big slide.

The north shoulder contains a large amount of material, the face is steep, the fractured limestone above the fault plane gives it an insecure base. It is practically unsupported except on the north side and

this

this support is weakened by the joint planes. The same causes that brought down Turtle Mountain may bring it down, and if it breaks away there is nothing, as there was in the case of the former slide to prevent the material spreading over the town. The slope of the hill would cause it to run in this direction.

Of the various causes which were responsible for the big slide there can be no question but that the mining of the coal was a prime one. This is shown amongst other things by the correspondence of the limits of the slide, with the area of mined coal. Almost all the known slides of this nature and extent have occurred where the equilibrium of the mass has been disturbed by artificial excavations. When the adjustment is so nicely balanced the slightest disturbance, a movement of a fraction of an inch, is liable to precipitate a slide. If the proposed work is carried out readjustments of the mass cannot be prevented, there is bound to be some movement.

In the report on the Frank slide we expressed our conviction regarding the connection between mining and the catastrophe. It was not considered necessary to emphasise this point at that time, for the company had had no means of knowing that its operations were a menace to public safety. Now the case is otherwise. If the mountain is further disturbed by mining operations and a slide occurs the Company would certainly be held responsible. This is too great a risk to run for the sake of the coal [illegible] that would be won.

I am loath to write as I have done, for my sympathy is with the Company, but in the interests of the Company as well as in the interests of public safety to call attention to the conditions [illegible] is a duty which I cannot evade.

Yours very truly,

Canadian Coal Consolidated Co. Ltd.,
Frank, Alta.

Woods & Steel
SURVEYORS AND ENGINEERS
COAL LANDS BOUGHT AND SOLD

Pincher Creek, Alta. 6th. November 1911

W. G. Miller, Esq.
Bureau of Mines,
Toronto, Ont.

Dear Sir,

I herewith send you a report on the Frank slide, as I did not know what amount of information you had obtained on the ground I have gone over the whole situation.

Any further information or explanation you may require Iwill be pleased to forward to you.

As to the new crevices and widening of the old one reported by the Geological Survey, I wouldhaveto be shown very strong evidence of the facts before accepting them.

Replying to your inquiry ofthe 14th October :

I do not know of any fissure existing at the summit of Turtle Mt. previous to the slide, nor never heard of any.

The only mesurements taken of Turtle Mt. previous to the slide were made by Mr. Drewry D.L.S. for the Interior Department and shown on a map that was never published.

Yours truly,

H.E. Woods

Pincher Creek. Alta. Nov. 6th,1911.

W.G. Miller, Esq.,

Convener ~~Royal~~ Commission on Turtle Mountain,

Bureau of Mines,

Toronto. Ontario.

Sir;-

I beg to submit to you the following report on observations I have made in the vicinity of Turtle Mountain before and after the Frank rock slide.

For two years previous to the slide I had lived at Frank and had done considerable surveyying in the surrounding country, as well as in the Mine, so that I was familiar with the general conditions around the place. During the two months following the slide I made several ascents of Turtle Mountain, to observe the effects of the slide, the possibility of another slide, and to make sketches of the crest of the mountain showing the position and direction of the crevices. These sketches were left with the coal company, but cannot be found to-day.

The slide occured on the morning of April 29th, 1903. Without the slightest warning a mass of rock approximately 400 ft. thick 2,000 ft. long and 3,000 ft. high came thundering down the mountain scooping out the bed of the river and rushing across the valley, in places over a mile wide, ascending the opposite slope until it reached points over 300 ft. above the River. It carried boilers, machinery, cars and rails a considerable distance, some of them being shoved to the outer edge of the slide, filling 1200 acres of the valley with debris from 20 to 50 ft. deep.

At the North East part of the slide large pieces of lime stone rock similar to that of the slide were found imbedded in the soil quite a distance from its edge as if they had fallen from a great height. This gave rise to a rumour that the slide was caused by an explosion, whilst in reality these rocks were thrown high up in the air when the slide exploded Poupore & McVeigh's powder magazine in the vicinity.

My first examination of the top of Turtle Mountain was made some ten days after the slide, the town was totally deserted and citizens were anxious to know if the danger was past and if there was any safety in the place. On reaching the summit I was surprised to see the great distance back from the original face of the mountain to where the slide had broken off, which I estimated at 400 ft. Back from the new crest the surface was broken up for quite a distance down the Western slope of the Mountain by large fissures running in different directions. A fissure a few inches wide ran from the line of break in a north westerly direction behind the north peak. There was also another small crevice probably less than half an inch. This was the cause of much alarm as the sliding of the North Peak would certainly wipe out the town. Reference points had already been placed on each side of the crevice and measurements had been taken for several days previous without showing any alteration in the width of the crevice. After carefully considering the facts in the manner described further on, I concluded that there was no danger whatever from that part of the mountain where the slide took place, although avalanches of rock were roaring down every few hours, but never reaching the River, and that there were no signs of immediate danger from the North Peak, consequently in a few days citizens returned to their homes and have occupied them since. To arrive at the above conclusion I considered that there were four different causes that might have brough about the catastrophe.

1st- The alteration, through the action of water, of certain strata near the base of the mountain to a point where they would crush under the weight of the mountain.

2nd- A violent earthquake,

3rd- A mine explosion,

4th- A settlement of the mountain due to coal mining operations carried on at its base.

Considering the first cause I found there were no such rocks in the slide, neither could any be found on the face of Turtle Mountain, nor any where else in the same formation, further more had there been a very soft strata at the base of the Mountain only the outer edge could have been crushed and squeezed out by the pressure of the mountain, this might have caused at most a small slide, and supposing it had reached the crest it would have broken off just like a high clay bank when undermined by a river without shattering the ground for a long distance back of the face.

The second cause is easily disposed of, there were no records of earthquake at that time, and an earthquake, violent enough to cause such a disturbance would have been felt for a long distance and surely reported upon.

The third cause, is easily disposed of, as no explosion took place in the mine, there were 17 miners in it at the time, and all were rescued alive the next day and further no mine explosion could be violent enough to disturb one hundredth part of the ground which had been disturbed above the mine.

The fourth cause is the one upon which I fixed as being responsible for the disaster. After carefully considering the nature and direction of the crevices at the crest of Turtle Mt. and the disturbed surface for a long distance down the west slope I concluded that such a result could only be brought about by a settlement of the entire mountain side. I have already shown that this settlement could not be caused by soft strata at the base of the mountain, therefore the cause had to be looked for elsewhere. As the slide occured just above that part of the mine which had been worked out this was the first place to investigate.

The coal seam is 10 ft. thick and extends along the base of Turtle Mountain, at the shaft it is 1800 ft. to the east of the base of the mountain whilst it is only some 300 ft., three quarters of a mile south of the River the seam is almost vertical dipping 85° to the west, the crop rises from the river to a height of 1800 ft. some 4000 ft. south of the River. The annexed sketches showing a cross section through the part of the mountain that slid and a section between the River and the shaft are only made from memory and are to be taken for the purpose of illustration and not as an exact production of facts.

The coal was mined in rooms 200 ft. long that reached from the pillar above the main entry to the height of from 300 to 600 ft., pillars 40 ft. thick were left between the rooms with a manway through them. Some of the rooms did not reach the surface as the small pillars crushed and blocked the manways. The mined coal was then drawn out and the rooms emptied as much as possible. At the time of the slide there was roughly an area of 2500 ft. long from 300 to 600 ft. high from which half of the coal had been drawn. The east wall of the coal is a thick bed of very hard sandstone which never showed any signs of breaking in the mine, whilst the west wall was composed of shale which when not supported it peeled off in large slabs and was drawn through the chutes with the coal. By referring to sketch #1 it will be seen that the west wall was subject to a tremendous pressure from Turtle Mountain which rested against it.

A few months before the slide, trouble was experienced from crushing in the main entry timbers snapped and had to be greatly strengthened, deep rumbling noises were occasionally heard later on the rumbling was more continuous, some days miners would remark "the mine is roaring to-day", when the mine was re-opened after the slide this roaring had completely ceased. The crushing of the pillars and timbers was caused by the extra pressure brought on them by the removal of the coal in the rooms that once carried a proportion of the weight. The rumbling noises, by the breaking of the strata under tremendous pressure as it filled the void in the worked out rooms, and made its way up to the base of the mountain, for some time the hard limestone stood up above the void forming at its base, this void kept increasing in size until a large part of the mountain, deprived of its support, settled down all at once, and caused a large part to slide down into the valley.

Subsequent to the slide having occured the strata of Turtle mountain in that part which remained behind the area of the slide all shattered and crushed and no large amount of rock could come down at one time, therefor no danger to the town was to be feared from that point. The theory of the slide being caused by a settlement of the mountain, due to mining operations at its base is borne out by the evidence of facts and there is not a single fact that would favor any other theory.

The other source of danger to the town was from the threatening aspect of the North Peak, which might detach itself from the mountain along the line of a small crevice at the back and wipe out everything in its path.

It was established without question that no further motion took place back of the North Peak after the slide. Accurate measurements frequently taken between reference points on each side of the crevice failed to show any divergence from the first measurements. The crevice being on the furthest outskirts of the line of settlement radiating ~~from~~ to the North it was probably of no great depth. This crevice is the only trace left of the terrible forces that battled during a few moments before the middle peak found the resistance of the North Peak too great to draw it down in its awful plunge. If the North Peak was solid enough to stand the tremendous shock and pull exerted by the Centre Peak, it certainly is sufficiently solid to stand by itself in spite of the crevice at its back, which was formed at the time the two peaks were engaged in a terrible tug of war. The plane of stratification of Turtle Mountain dipping at about 45° to the West is a great factor in holding up the peak as may be judged from the face of the shattered and creviced rocks standing up in a vertical position for several hundred feet at the crest of the slide. After considering the immense amount of sound hard rock which would have to be broken on the west as well as on the north side of the peak to detach it from the mountain before it would slide, it could not be realized that the peak would fall without a further disturbance of its base.

It was on the above considerations I based myself eight years ago when I considered that the Town of Frank was in no immediate danger of another slide.

Some alarm has lately been caused by the fear that the mining operations now being carried on between the shaft and the River would endanger the base of the north peak. The lowest workings here are less than 800 ft. below the surface, whilst the base of the mountain is about 1200 feet to the west. Sketch #2 is a section taken at this point, shows that the line of settlement would never reach the mountain, Of course the further south the workings are carried the nearer they come to the mountain, and at some point will become dangerous. I would strongly advise that a photo-topo-graphic survey of Turtle Mountain be made and a contour map prepared on a large scale from which accurate sections across any part of the mountain and mine could be made and used to determine the safe areas in which mining could be carried on.

A recent report of the Geological Survey states that new crevices had formed back of the north peak and that the old crevice had widened out. Unless I had full details of the system adopted in measuring the crevices the amount of disturbance found the nature of the measure employed, the distance between the reference points and their power to withstand disturbance, I would be inclined to disbelieve the report.

I was told by a party in Blairmore that a few years ago he placed a wedge shaped stone in the crevice, in such a position that if it widened out the wedge would drop down. When the rumour spread of the widening of the crevice he made the ascent and found the wedge shaped stone in the exact position he had placed it. Dr. Stewart of Winnipeg then a student at Frank kept a record of t the measurements between the reference points on each side of the crevice during all the summer of 1903, it would be important to have a copy of these and a verification of the measurements made. As to the report of a new crevice forming at the rear of the North Peak, it would be important to know the width of it, and if it might not have been covered by shingle and overlooked on the occasion of previous examinations.

Respectfully submitted,

J. E. Wood

MENT OF
ICAL SURVEY OF CANADA
RECEIVED.

MAR 8 1912

ANS

March 4, 1912.

Dear Sir:-

I received copy of your letter of February 29 addressed to the Director, Geological Survey, in reference to the J. E. Woods matter.

I fully concur with your statement that the Commissioners appointed to investigate the condition of Turtle Mountain did not authorize the engagement of Mr. J. E. Woods. My recollection is that when we received the Committee from the Village Council of Frank among other witnesses, they suggested that Mr. J. E. Woods had knowledge of certain facts. The Commission inquired and did not feel from the statements made by the members of the Committee, that Mr. Woods could throw any additional light on the problem. We felt that mere opinions would be of no value. The Committee, however, was insistent that Mr. Woods might know about points of material value, and wholly in deference to the opinion of the Committee, The Commission advised the latter that if they wished to arrange it they might try to have Mr. Woods meet ~~them~~ enroute. The Committee sent the telegram but the Commission hearing Mr. Woods was not at Frank at the time of the slide and that apparently his information was of a casual nature, did not consider it worth while to withhold writing their report but finished same at Frank, and on the train before having any communication from Mr. Woods bearing on the subject. It is also evident from an inspection of Mr. Woods report that his knowledge is hearsay and that his statements are merely opinions based on theoretical considerations rather than on knowledge of facts.

Yours very truly,

Geo S Rice

~~Chief Mining Engineer~~
Member of Commission

Mr. W. G. Miller,
Convener of Commission,
Toronto, Canada

CANADIAN PACIFIC RAILWAY COMPANY
OFFICE OF THE GENERAL EXECUTIVE ASSISTANT
MONTREAL

October 3rd 1930.

DEPARTMENT OF MINES
OCT 4 1930
OFFICE OF THE DEPUTY MINISTER

L. L. Bolton, Esq.,
Assistant Deputy Minister of Mines,
Ottawa, Ont.

Dear Sir,-

I am informed that a short time ago Dr. Camsell advised that Mr. Archibald of the Consolidated Smelters Company while flying over the Frank Slide observed that the crack on the south side appeared to be considerably widened. A party of our Officers scaled the north peak of Turtle Mountain on the 21st instant, but failed to discover anything unusual. On the 25th two of our local Officers ascended the mountain going up the south peak from Hillcrest and crossing the top above the slide area, descending the north slope into Blairmore. They report that they cannot find any signs of recent movement anywhere. The widest crack on the south peak is about twelve feet. The s~~l~~ides of this crack are decayed rocks, which are gradually falling in and filling the crack, and this might tend to make persons looking at it from an aeroplane think that the crack had widened. The crack ~~area~~ between the two peaks, also the face of the slide show indications of sloughing, but no recent movement. There is at the present time about a foot of snow on the upper level, which might possibly cover small cracks.

However, to be on the safe side, it would be well if you could have your Geological Geographical Survey Department make a check of the mountain and compare the result with the records that your Department have maintained since the slide occurred in 1903. I believe that your Map 57-A, 1917, deals specifically with this slide.

I should be pleased indeed to hear from you as to the results of your check up.

Yours truly,

J. O. Apps

General Executive Assistant.

Dictated

2306

Ottawa, Ontario,
October 10, 1930.

✓ J. C. Apps, Esq.,
General Executive Assistant,
The Canadian Pacific Railway Company,
Montreal, Que.

Dear Mr. Apps,-

Your inquiry of the 3rd. instant about Turtle mountain, Alberta, has been referred to the Director of the Geological Survey, since the investigation of the Frank landslide of 1911 was made by the Geological Survey.

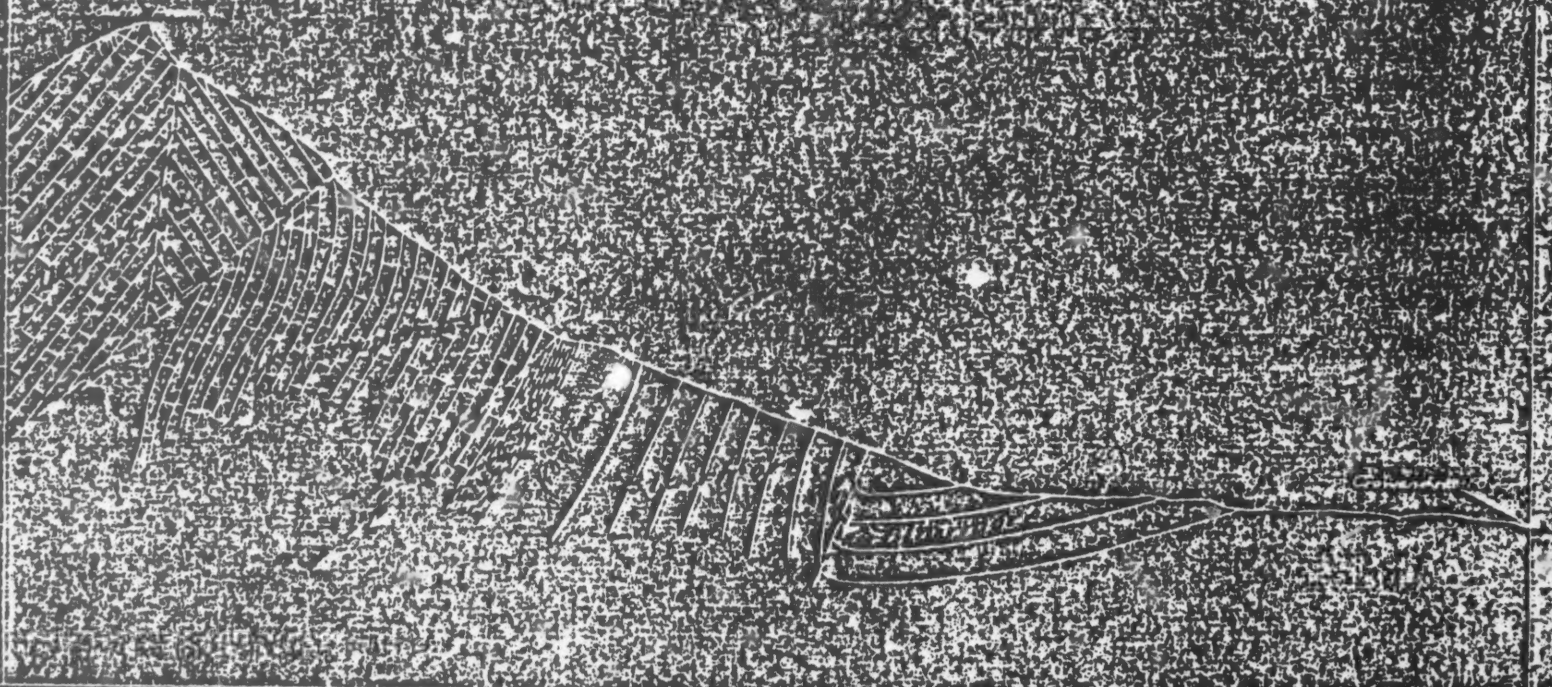
Mr. W. H. Boyd, under whose direction the Topographical part of the investigation was performed, states in reply:

> "There is no way of making a checkup. No measurements of the width of the numerous cracks on Turtle mountain were made. No permanent marks for future reference were set at the time of the 1911 survey; these were not requested at the time, although the establishing of such marks were recommended in the report of the 1911 Commission.
>
> Even if these marks had been established, a widening at the surface of the major cracks might not be as good an index of the downward movement of the block, as a closing of the cracks at the surface; for the shape of these blocks resembles an inverted prism and any dangerous movement might be indicated by a closing of the crack at the surface, accompanied by a slip downwards. In other words, a widening of the major cracks at the surface may not be a proper index of the movement of the block, but may be due entirely to weathering conditions along the edges.
>
> The part of the mountain to observe for signs of movement is the North Peak and North Shoulder. Here, movement took place between the time of the great slide in 1903 and the year 1910, as evidenced by the appearance of the new cracks in the year 1910. Other newer cracks should be searched for and the condition of these cracks which were seen in 1910 should be studied. This is the only place I know of where recent movements might be detected. This area is in the danger zone as outlined by the 1911 Commission."

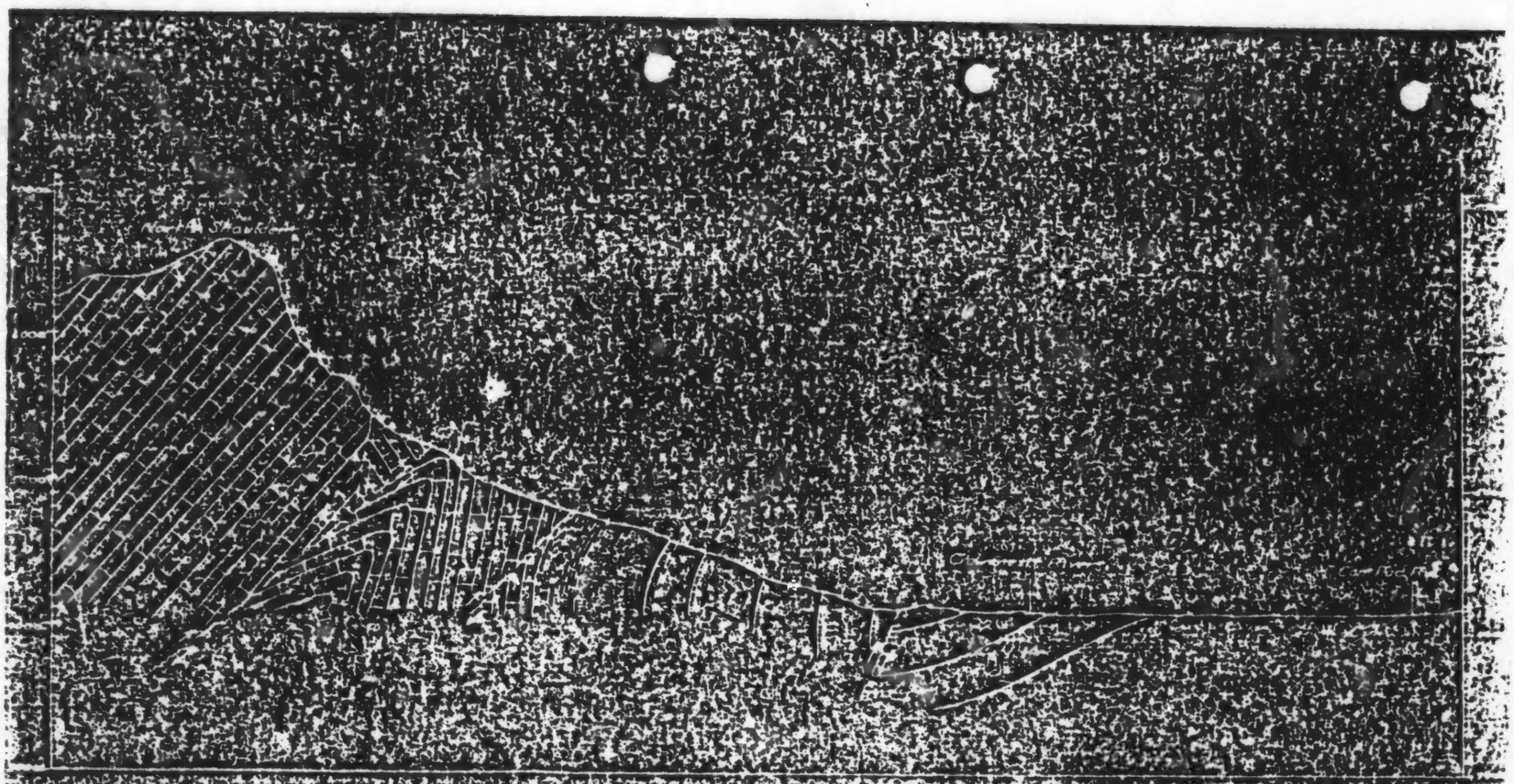
A copy of Memoir No. 27, containing the report of the Commission, is also being sent to you under separate cover. Your reference of this matter to us is appreciated and we shall be glad to be informed about any further observations that you may have made of Turtle Mountain.

Yours very truly,

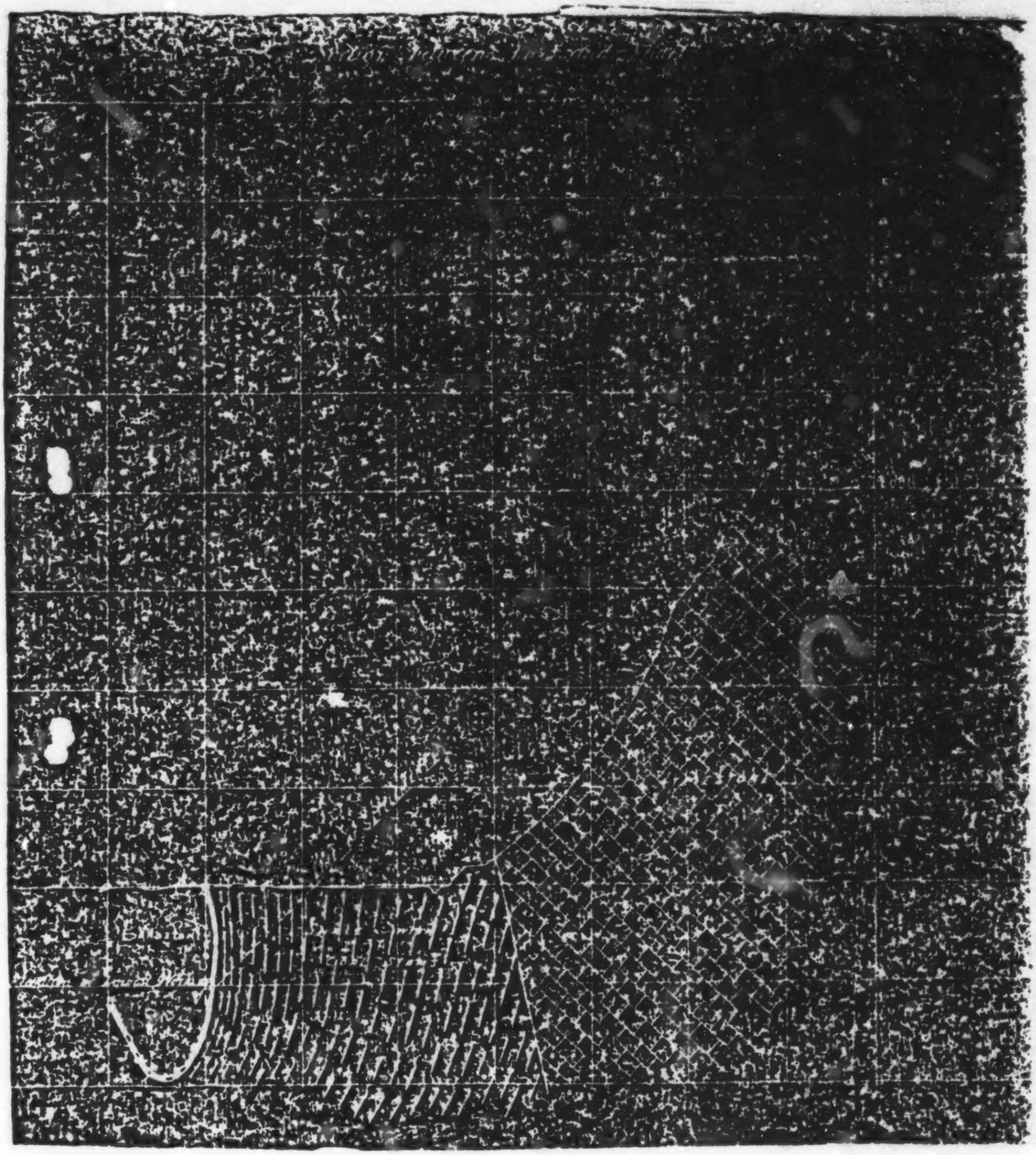
Acting Deputy Minister.

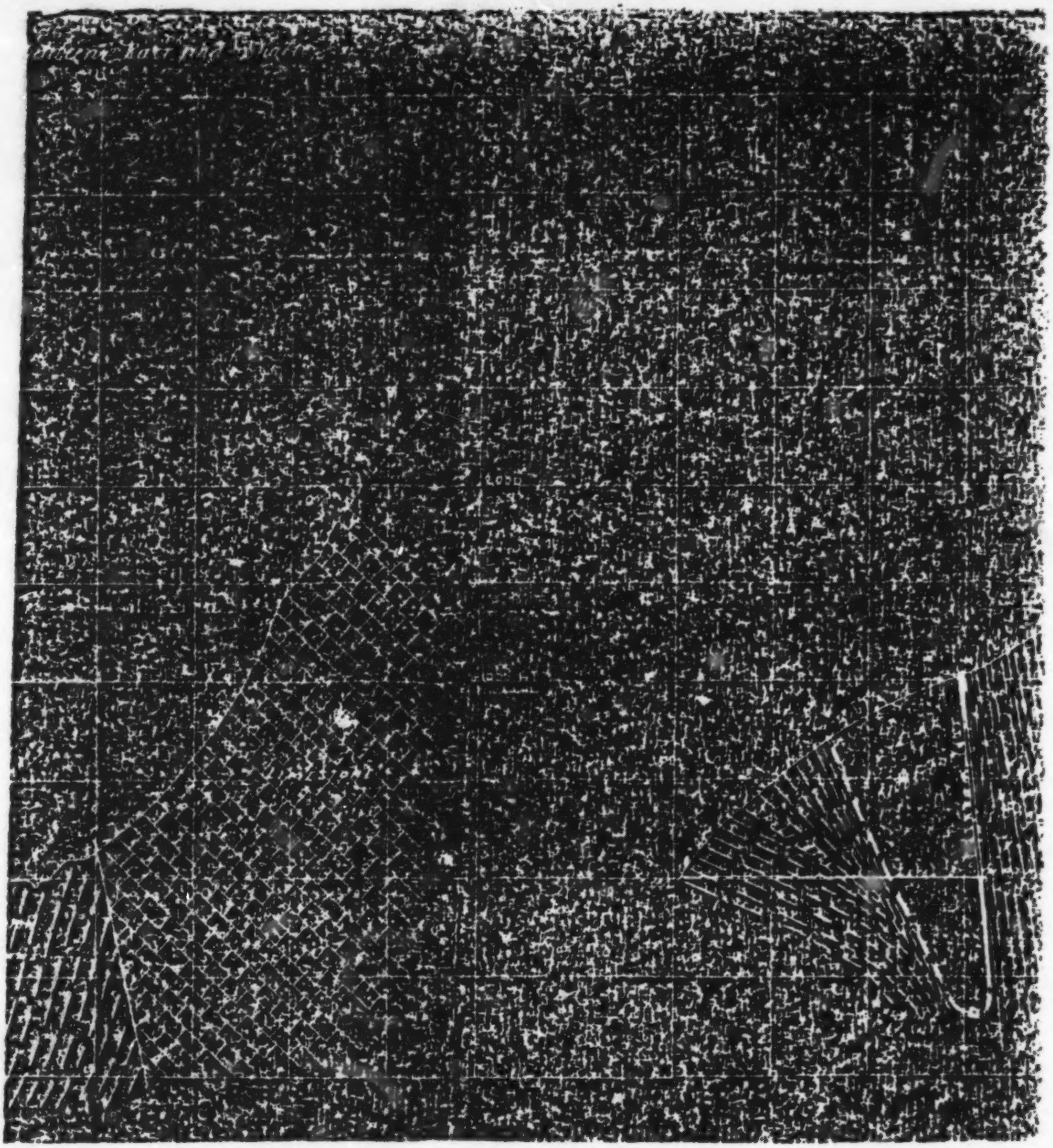


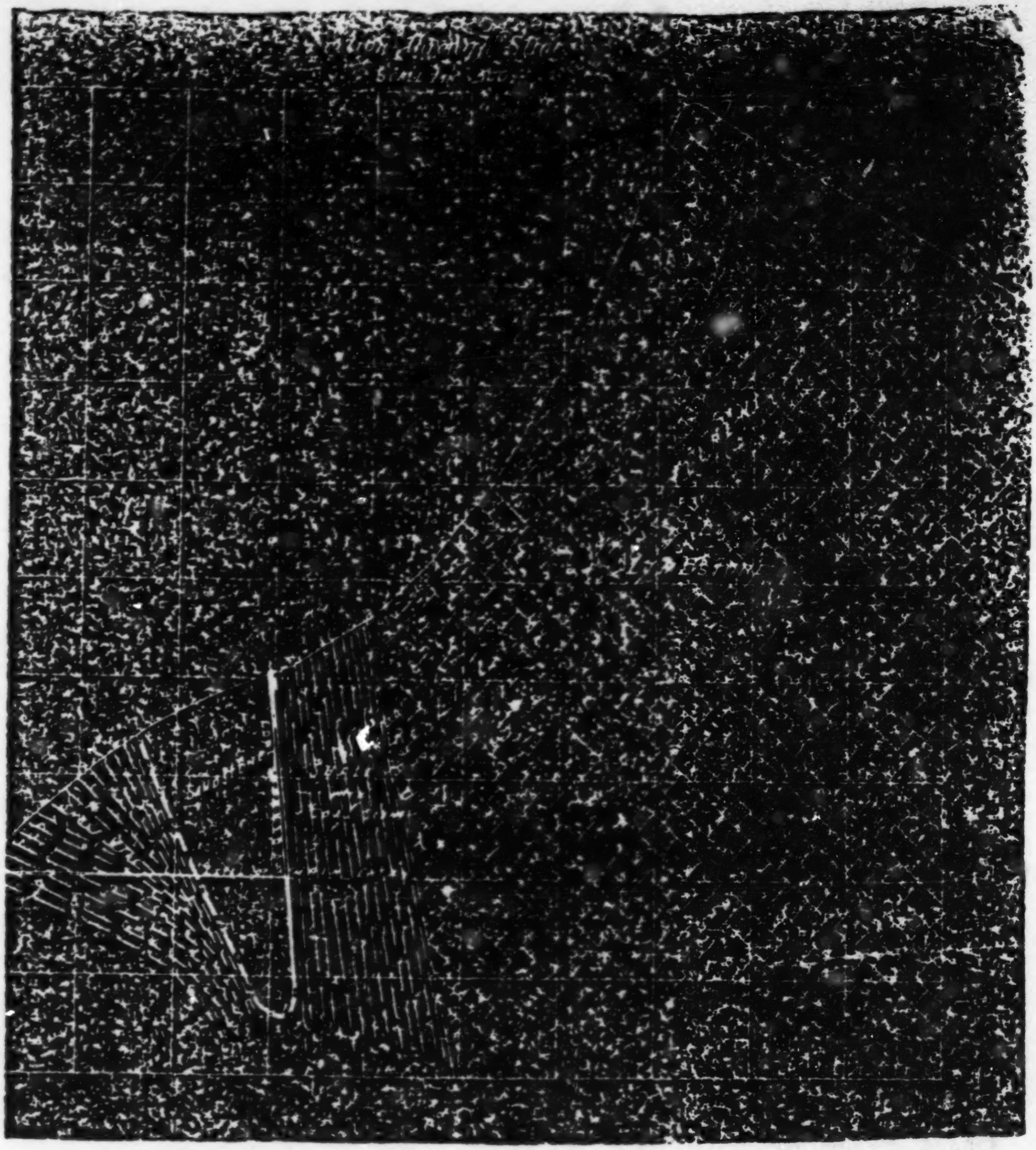
Geological Structure Section through South Peak in True East direction
Scales (Horizontal and Vertical) equal 1 inch to 800 Feet



Geological Structure Section through North Shoulder in True East direction
Scale (Horizontal and Vertical) equal 1 inch to 600 feet

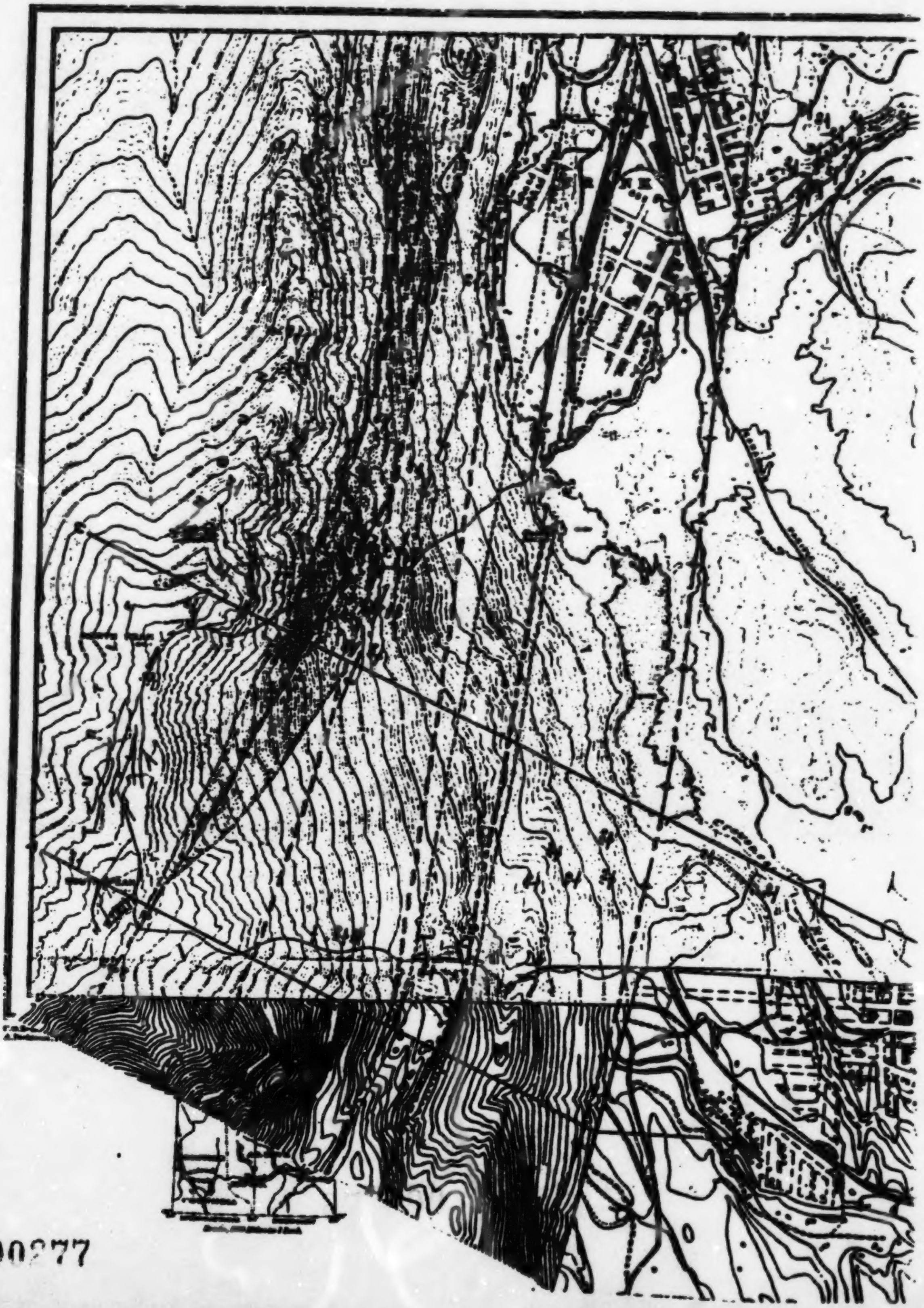






Canada
Department of Mines
Hon. E. L. Patenaude, Minister; R. G. McConnell, Deputy Minister

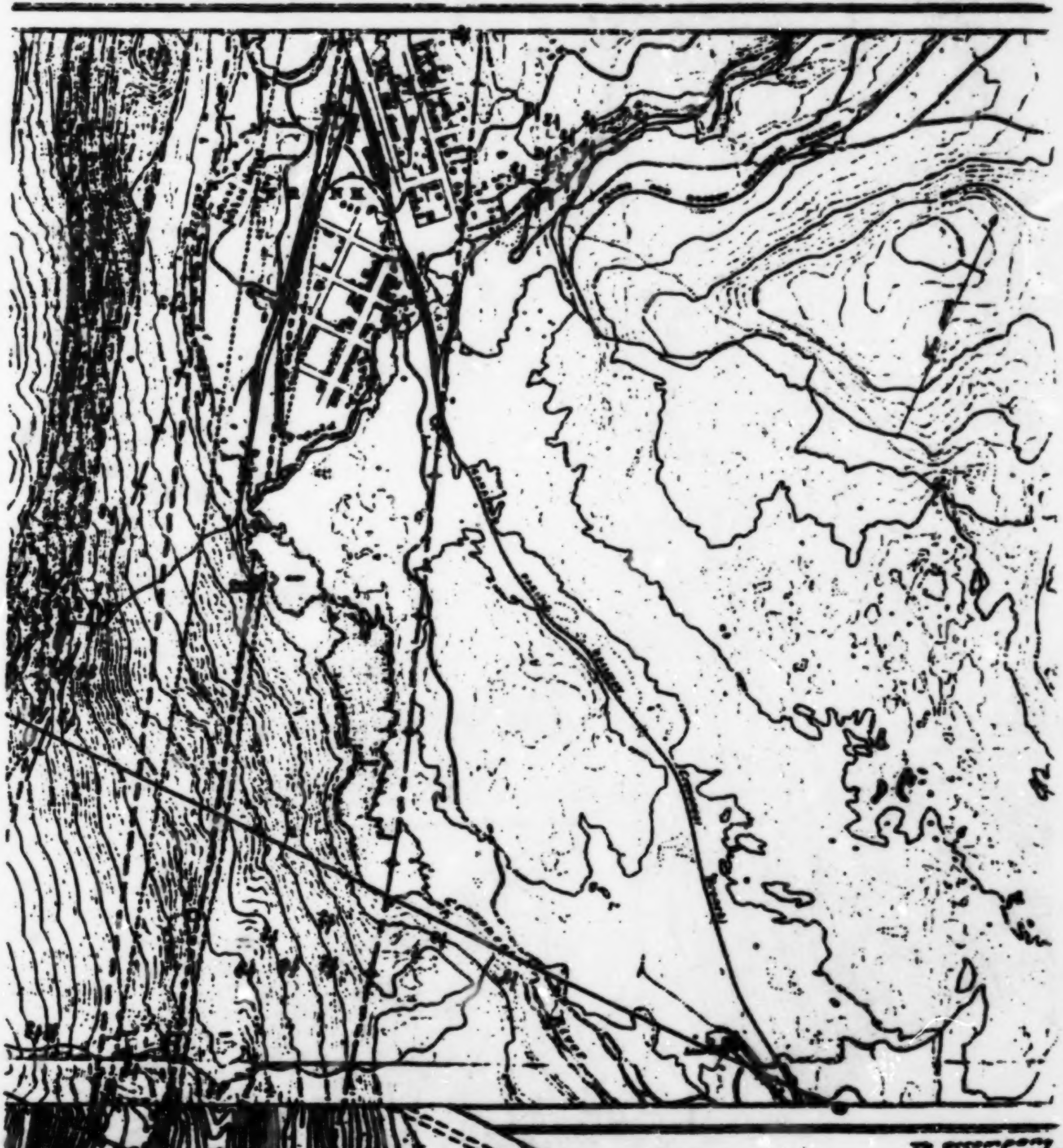
GEOLOGICAL SURVEY



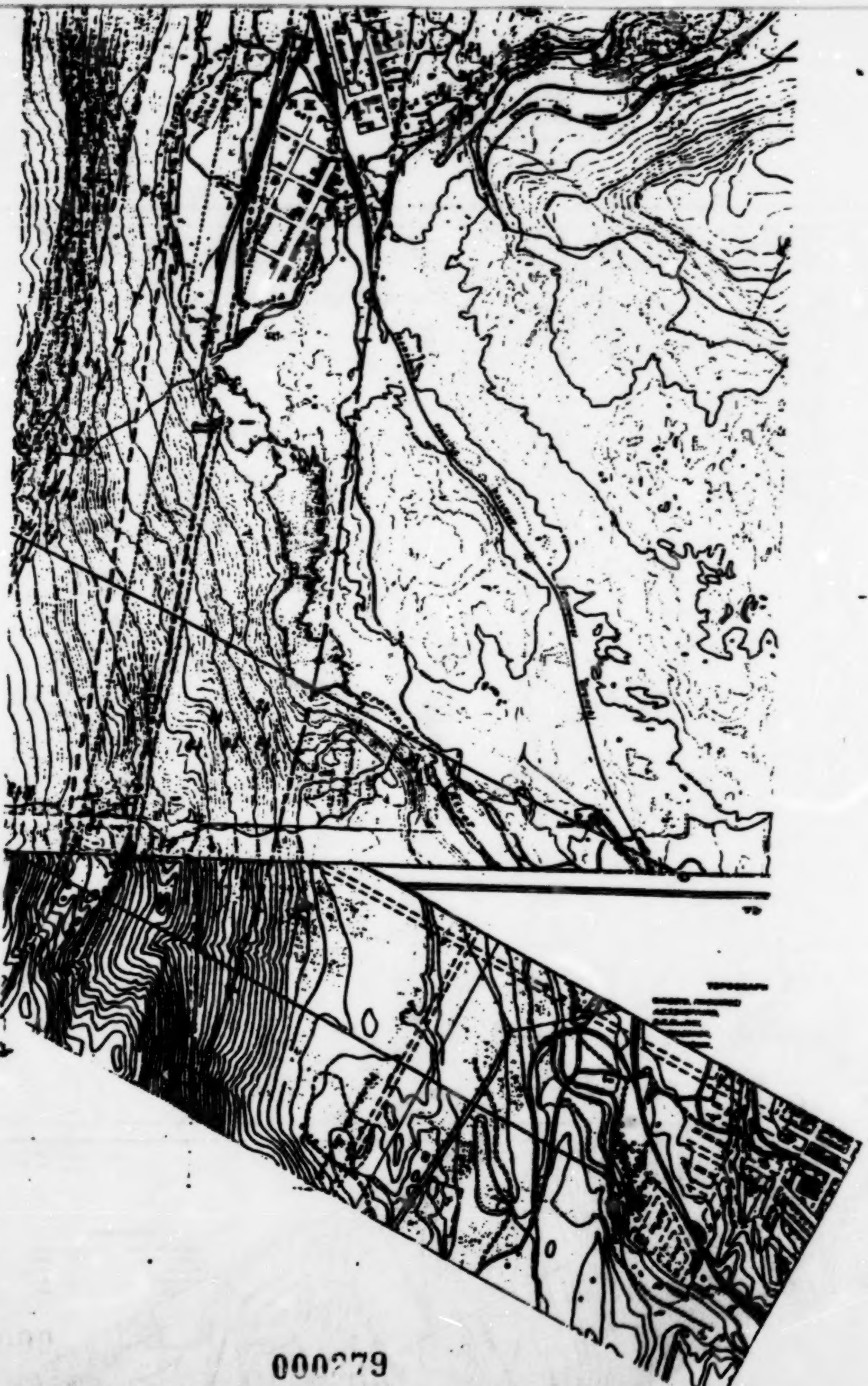
000277

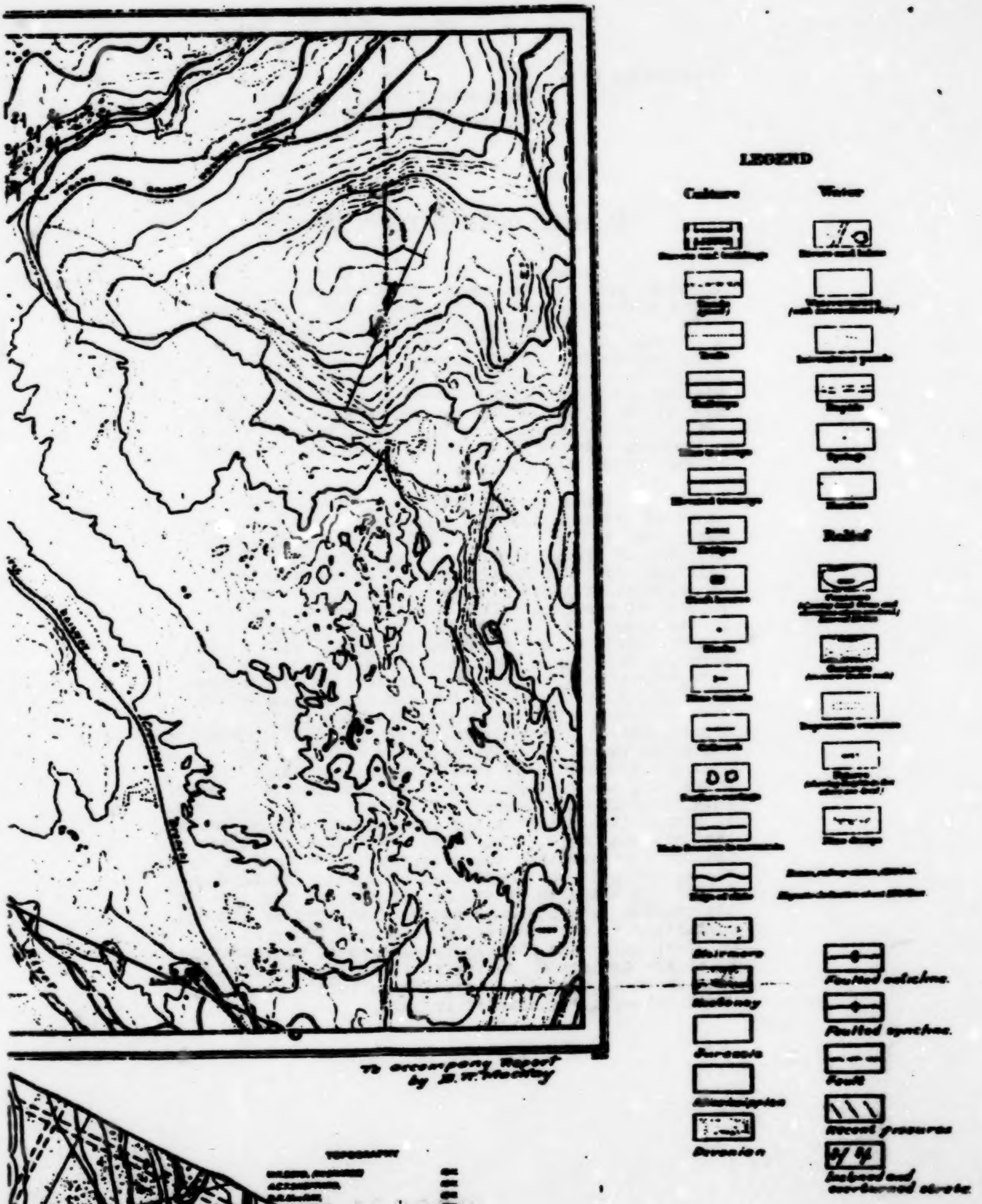
Canada
Department of Mines
Hon. E. L. Patenaude, Minister; R. G. McConnell, Deputy Minister.

GEOLOGICAL SURVEY



To accompany [illegible]
by [illegible]





To accompany Report by B. R. Mackay

1

File cd.

Ottawa, July 31, 1931.

Memorandum to :
The Honourable W. A. Gordon,
Minister of Mines,
Ottawa.

---

**Re Turtle Mountain, Frank, Alberta.**

On April 29, 1903, a portion of Turtle Mountain gave way and swept downwards and eastwards with dire results to both property and human life. A Commission consisting of Messrs. R. G. McConnell and R. W. Brock, then geologists on the staff of the Geological Survey, was appointed to report upon the disaster. The findings of the Commission were published in the report of the Department of the Interior for the year 1902-03 and the cause of the disaster was attributed to coal mining operations carried on beneath the entire huge block of rock which broke away.

Subsequent to 1903 the mountain was examined several times by officers of the Geological Survey and in the autumn of 1910 R. W. Brock, then Director of the Geological Survey, went over the critical area with the Provincial Mines Inspector and several officers of the local coal company. This visit resulted in the publication of a report in the summer of 1911 (Geological Survey Summary Report, 1910) by Mr. Brock as the Survey felt it must publicly repeat and emphasize the seriousness of the situation that those directly interested might take what action was necessary for the protection of the town of Frank. This publicity resulted in the appointment by the Dominion Government of a Commission including Dr. R. A. Daly, Research Professor of Geology, Massachusetts Institute of Technology, (representing the Geological Survey), Mr. George S. Rice, Chief Coal Mining Engineer of the United States Bureau of Mines, (representing the Canadian Coal Consolidated, Limited) and Dr. W. G. Miller, Provincial Geologist of Ontario (representing the citizens of the town of Frank) "to investigate the conditions of Turtle Mountain and to delimit the area of ground, if any, at the base of the mountain which should not be disturbed by mining operations." The Commission commenced its work in October, 1911, and its report was issued as Memoir No. 27 of the Geological Survey entitled "Report of the Commission appointed to investigate Turtle Mountain, Frank, Alberta," published in 1912.

From 1912 until the present year the Department of Mines does not appear to have taken any active interest in the condition of Turtle Mountain; but an examination of the mountain by Dr. B. R. MacKay of the Geological Survey was arranged for during this summer as a result of an exchange of correspondence between Mr. J. O. Apps, General Executive Assistant of the Canadian Pacific Railway Company, and Dr. Camsell.

Dr. MacKay's report, dated Hillcrest, Alberta, July 25, 1931, was put in my hands on the afternoon of July 30th. This report contains conclusions which, in part, read as follows :

> "From the above it may be concluded that the structure of Turtle Mountain prior to the 1903 slide presented more unstable conditions than does the part of the Turtle Mountain crest line which now remains. The most unstable portion of the Mountain at the present time appears to be the South Peak area which is almost completely surrounded by fissures. The structural conditions at South Peak closely resemble those which are believed to have existed over most of the area on which the slide took place. Should a slide from this area of the magnitude indicated by the block bordered by the crevasses take place it will probably result in damming Crowsnest river, wiping out a portion of the motor highway and the Canadian Pacific Railway line at the east end of the present slide, endangering life, and destroying buildings and other property in the vicinity of the eastern end of the slide and Hillcrest station. A close check should be kept on the condition of this portion of Turtle Mountain therefore to determine whether the crevasses are getting wider or more numerous with the object that should such prove to be the case measures may be taken to reduce the danger either by blasting off portions of the peak in the danger zone, or by removing the buildings in the vicinity of Hillcrest station, the Alberta highway across the eastern portion of the slide and possibly part of the C.P.R. tracks."

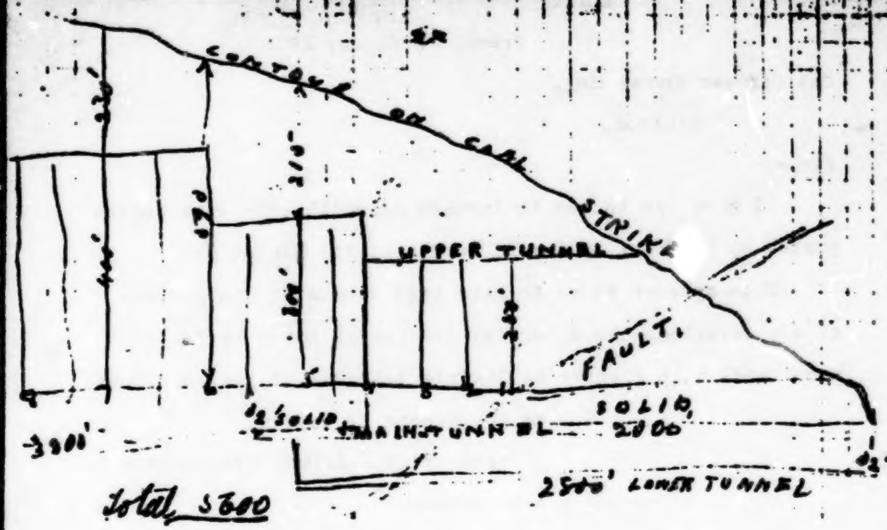
While it is not held by Dr. MacKay that a rock slide is imminent, there appears to be potentially such a possibility of disaster that it would appear imperative that copies of his report should be forthwith put in the hands of interested parties. These are the Canadian Pacific Railway Company because of the extent of its property affected, and the Provincial Government, because of its interest on its own account in a highway and as the representative of its citizens living in the potentially dangerous area.

Anticipating your concurrence in this suggestion, I am sending you herewith letters addressed to Mr. J. O. Apps, General Executive Assistant, Canadian Pacific Railway, Montreal, and to The Honourable J. E. Brownlee, Premier of Alberta, Edmonton, to inform them of Dr. MacKay's investigation of conditions at Turtle Mountain and to convey to them copies of his report.

Respectfully submitted,

Acting Deputy Minister.

[illegible]



Old River Bed to Main Tunnel Rail Level 45'
Water Level North " " " " 23'

COPY.

Frank, 23rd. May 1903.

The Officer Commanding,
Macleod.

Sir,-

I have the honbur to forward herewith copy of a notice posted up in Frank by the Directors of the Mining Co.

This appears to me to have been done with the purpose of counteracting the effect of the notice given by me, in accordance with Premier Haultain's telegram of the 18th.inst.

I have the honour to be,etc.

-sgd- Hugh J.A.Davidson,Inspector.

-o-o-o-o-o-o-o-o-o-o-

Canadian American Coal & Coke Co.

NOTICE.

At a special meeting of the Board of Directors of this Company, Held at Frank,Alberta,May 20th. 1903,it was resolved as follows: that whereas the rock slide from Turtle Mountain causing damage and loss of life as is well known,it is decided to state for the information of those whom it may concern,that this company immediately after the said rock slide,had very careful examination made of Turtle Mountain by its own Superintendent and specially employed experts,the result of which warrants the belief that there is no immediate danger to the remaining portion of the town. Instructions have been given for complete survey of the West Peak,and bi-weekly measurments of the craks will be taken for the ensuing year under the direction of Company's Engineer and should these measurments show any increase of movement,the residents will be immediately advised of such.

The Company believes it is the intention of the Government to carry on similar observations. In the meantime the mine will be opened at several points along the strike of the coal measures which are entirely safe and free from any possible further rock slide.

The main shaft and main openings will be equipped with most modern complete and up to date machinery,capable of a daily output of 2500 tons.

The miners dwelling houses and other buildings now on the Southern portion of the town will be removed to a Townsite to be laid out on the North side of the C.P.R.tracks,and nearer to the base of the mountain on the North side of the Pass

It is desired to express gratitude to all those inhabitants who have rendered inestimable aid to this Company during the past and to assue its employes and other inhabitants of the town,that no expense will be spared to ensure their personal safety and welfare in the future.

By order entered in the Company's minute book this 20th.day of May 1903, and signed.

H.L.Frank, President.
S.W.Gebo,Vice President and Genl Mgr.
G.E.Wiltse, Secretary.

Copy.

Imperial Hotel, Frank ---

The Officer Commanding,
N.W.M.Police,
Macleod.

Sir,-

I have the honour to forward a copy of telegram received by me this morning from Mr.Haultain. In accordance with instructions containedtherein, I have personally notified all parties living in Frank, and have also put copies of the telegram in the Hotels and Stores.

Everything here is very quiet and orderly.

I have sent Sergt.Arner back to Pincher Creek, to take charge there.

I have the honour to be, etc.

-sgd- Hugh J.A.Davidson. Inspector.

Copy of telegram.

Regina, 18th.May 1903.

Inspector Davidson,
Frank.

C.P.R.authorities report from Geological survey that West peak of Mountain is dangerous, and threatens entire destruction of remaining portion of town. Please consult McConnell and Brock and notify all residents. Wiring you direct as too late to communicate with Commissioner.

-sgd- F.W.Haultain.

True copy.
-sgd-Hugh J.A.Davidson, Inspt.

All residents warned. Messrs McConnell and Brock left for Ottawa last night.

-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Forwarded for the information of the Commissioner, Regina.

J.A.McGibbon
Inspector.
For O/C.absent on duty.

Macleod, 20-5-03.

Copy
Imperial Hotel, Frank
Officer Commanding
N.W.M.Police
Macleod.
Sir:-
I have the honour to forward a copy of telegram received by me this morning from Mr.Haultain. In accordance with instructions contained therein I have personally notified all parties living in Frank and have also put copies of the telegram in the hotels and stores. Everything here is very quiet and orderly. I have sent Sgt.Arner back to PincherCreek to take charge there.
I have the honour tl be etc.,
/Sg'd/ Hugh J.A.Davidson. Inspt.
-o-o-o-o-o-o-o-o-o-o- Regina 18th May.1903.
Inspt.Davidson,
Frank.
C.P.R. authorities report Geological survey that west peak of mountain is dangerous and threatens entire destruction of remaining portion of town. Please consult McConnell and Brock and notify all residents. Wiring you direct as too late to communicate with Commissioner.
/Sg'd/ F.W.Haultain.
Frank City,
/Sg'd/ Hugh J.A.Davidson.
All residents warned. Messrs McConnell and Brock left for Ottawa last night.
Forwarded for the information of the Commissioner, Regina.
/Sg'd/ J.A.McGibbon. Inspt.
for O/C A.O.D.
Macleod. 20/5/03.
Supt
for Commissioner A.O.D.

000296

GOVERNMENT OF THE NORTH-WEST TERRITORIES OF CANADA

DEPARTMENT OF EDUCATION

ADDRESS YOUR REPLY TO
THE DEPUTY COMMISSIONER
DEPARTMENT OF EDUCATION
REGINA
AND REFER TO
FILE ______
DO NOT WRITE ABOUT MORE THAN
ONE SUBJECT IN ANY LETTER

Monday night 9:30 o'cl

REGINA 18 May

My dear Perry

I have just received the following message from Mr Leonard, Asst. Genl. Manager C.P.R.,

" Have report from Geological Department
" Saturday that fissure 35 feet back
" from face on West peak has widened
" from six to eight ~~feet~~ inches past
" six days and that portion of
" Mountain between the two peaks has
" disappeared entirely taking away the
" support of the West peak and that they
" fear further trouble and suggest that
" the Town be moved to a point west
" of the danger. If not already arranged
for.

"for would suggest that the Government
"have a competent man daily watch
"movement as evident entire remaining
"portion of the town threatened."

As it is too late to get word to you tonight I have taken the liberty of wiring to Davidson to consult McConnell & Brock the two men from the Geological Survey Department and to notify all residents of the danger if their opinion confirms C.P.R report.

There does not seem to be anything else to do. We really have no power to order people out of the Town and due warning of the threatened danger should be quite sufficient.

It is also more than probable that something has been done already as Leonard got his report on Saturday.

I might say that I put in at the end of my telegram to Davidson — "Wiring you direct as too late to communicate with Commissioner".

Yours Sincerely
F.W.G. Haultain

May 7th,1903.

Dear Colonel White.

I returned from the west last night. On the 2nd inst I visited Frank,and went over the scene of the great landslide.

On my arrival there I found Supt.Primrose,Inspt's Davidson, Burnett,Wickham,and Douglas and 26 men. Inspt.Douglas and ten men from "F" Division arrived there with Mr.William Pearce at daylight on the 30th; the day following the disaster. Supt.Primrose Met Mr.Pearce at the station at Macleod,and he was informed by that Gentleman that he considered he had enough Police. As Supt.Primrose thought he was to be guided by Mr. Pearce in the matter,he did not proceed to Frank,but reported to me by telegraph. I immediately ordered him to proceed there as directed by you.

On the day of the accident,the 29th, Inspt.Davidson and ~~two men~~ one man rode up from Pincher Creek. There was one man on the detachment at the time of the accident.

Lt.Col.White,C.M.G.
Comptroller N.W.M.Police,
Ottawa. Ont.

I instructed Inspt.Douglas,and party from "E" Division to return to Calgary,where he should arrive today. ~~Inspt~~ Supt Primrose was to proceed to Frank on the 7th,and use his own judgment in reducing the strength. "K" Division men to return first.

There is no doubt that the strong detachment there had a very beneficial effect the first day after the accident. There was a great deal of drinking and considerable drunkenness. Eight men were locked up. On Saturday,the day I was there,the town was quiet. One of the American mine owners expressed his astonishment that after such a great disaster that the people should have so well behaved themselves. I

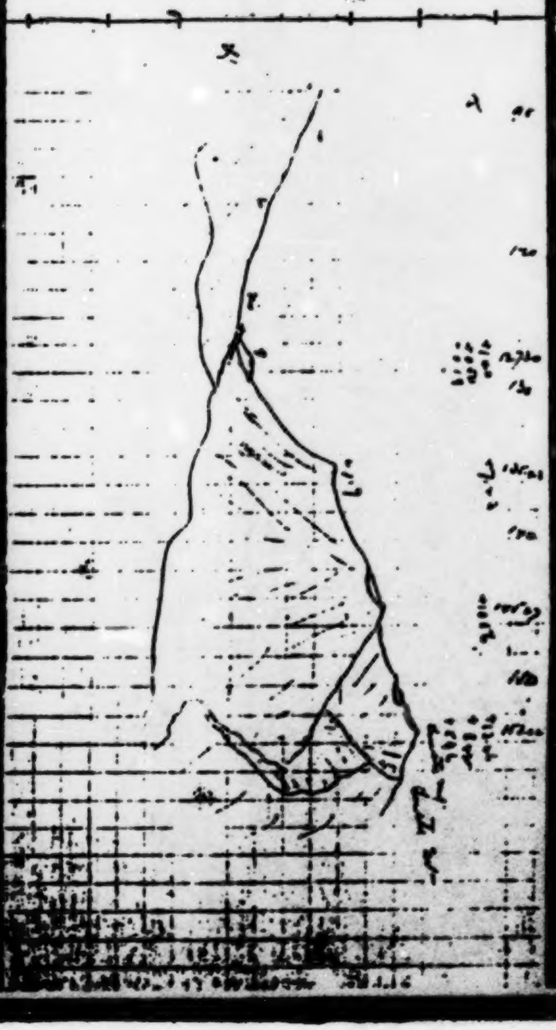
It is now conceded that the town of Frank is in danger from a second slide. On the east side of the rock slide there is an over hanging peak,which is very badly fissured,and from which large portions of rock were falling on Sunday. It is not possible to say when this mass of rock may break away,but until it does I should think the town unsafe to occupy. While I was absent I visited Macleod and Lethbridge.

Supt.Primrose is forwarding me copies of official telegrams,and other correspondence,between himself and Officers of the Dominion and N.W.T.Governments.

Yours very truly,

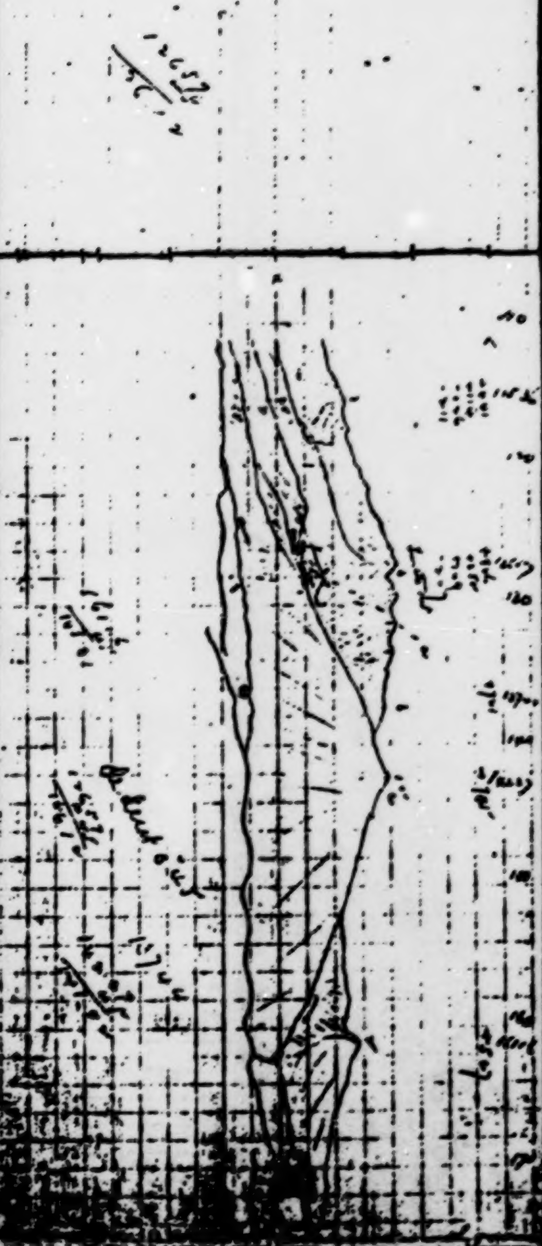
64' 8"
63 2
127' 10"

Bearing to Post N. [illegible] & S.E. Corner [illegible] [illegible]
S 48°-
Dist: on slope 127' 10"
Ang of slope 20°
Hor dist = 113'



S.E. Cor Samuel Allsup's Coal Claim.
(Located March 7 - 1901 - } Intersection
XVIII VII IX

Stk set on E+W line 915 ft East of post marked as above.



[illegible] – [illegible]

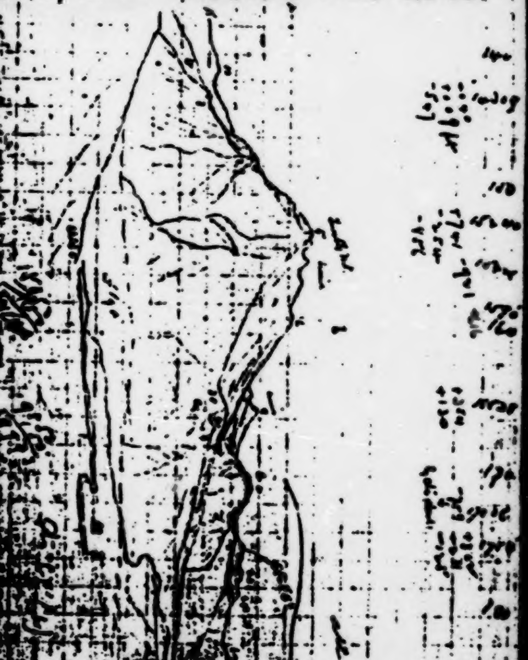
Contd

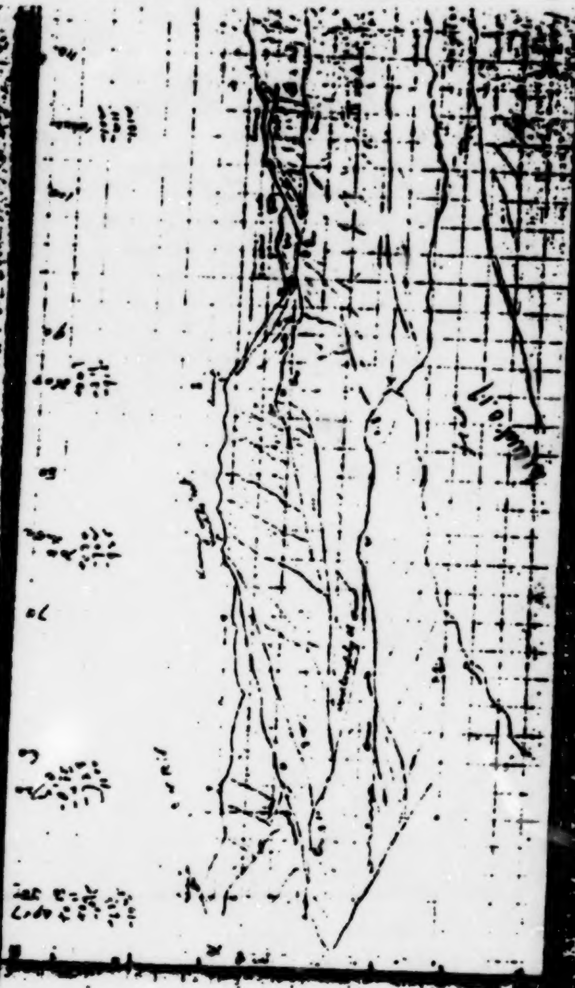
600 ft contd ab CE a Hard & [illegible] gray sandstone with some shaly conglomerate strike [illegible] dip 50° N. These are within the Coal measures & very probably higher — 200' East of Cochetti tunnel [illegible].
At 8?? CE similar rocks, ledge forms a [illegible]. Immediately underlying there is small coal seam about 4'. then about 20' sandstone & shales & then coal seam about 18' followed by black shale. Both these seams are [illegible] by [illegible] coal tunnel from [illegible] side of ridge.

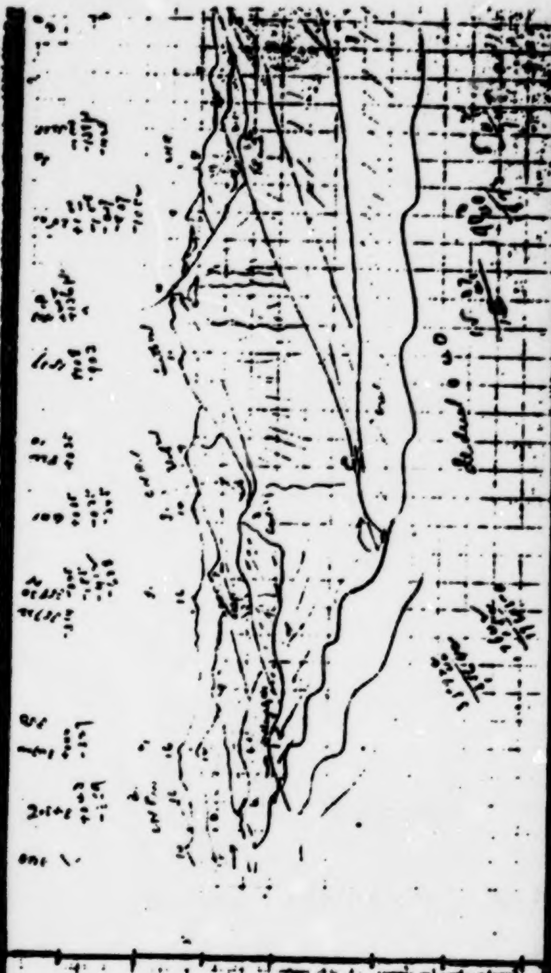
K

Thursday June 7th

AR. 7.00 am [illegible] 3066 = 6220 [illegible] CE







# Appendix 6

## Information from Additional Sources

1/

**DEPARTMENT OF NATIONAL REVENUE** Taxation Division

Calgary Public Building
205—8th Avenue S.E.
CALGARY, Alberta

Please quote this reference

L.W. Shulman

September 6, 1966

West Canadian Mineral Holdings Ltd.
Suite 800
1420 Sherbrooke Street West
Montreal, 25, Quebec

Attention: Mr. P. Jannès

Dear Sirs:

Destruction of Records
West Canadian Collieries Limited

This will acknowledge the letter of August 16.

The application having been reviewed, permission is granted to destroy the records of West Canadian Collieries Limited to December 31, 1959 as follows:

Cancelled Cheques
Bank Statements
Voucher Record Books
Sales Ledgers
Payrolls and Payroll Records
Receipt Books
Equipment Ledgers
Cost Sheets
General Correspondence

This permission to destroy the above-mentioned books and records is given pursuant to Section 125 (3) of the Income Tax Act and applies only in so far as the Taxation Division of the Department of National Revenue is concerned with such books and records. No permission, express or implied, is given on behalf of any other Department of Government, Federal, Provincial or Municipal which requires any person or corporation to maintain such records or documents.

Yours truly,

Director - Taxation

LWS/CR

# Appendix 7

## Oxbow Historical Research Ltd

## WEST CANADIAN MINERAL HOLDINGS LTD.

INTER-OFFICE MEMO

DATE: Sept. 19/66

TO: Mr. M. H. Congdon

FROM: P. Jannès

---

SUBJECT:

Your memorandum of September 12th 1966
DESTRUCTION OF WCC RECORDS

The interpretation of the Department of National Revenue's requirements, as expressed in paragraph 3 of your memorandum, appears right. You may, however, check it with Mr. Jarman.

Concerning general correspondence, I agree with your proposition to destroy all of the old files, except when information might be of importance with the new company.

Concerning the pictures which we had agreed to save, you may ask Mr. Brusset if he wants some of them and, of course, take yourself your pick; the balance could be destroyed.

PhJ:mdc

Panoramic view of Turtle Mountain. The course of the rock-slide is traceable by the light shade down the main mountain and across the valley to the extreme edge of the picture. The town site is behind the displaced rock at the foot of the main mountain. The enormous proportions of the slide may be realized when it is known that the valley shown in the picture is two miles across.

## THE ROCK-SLIDE AT FRANK.

A rock-slide, which in magnitude of material displaced is beyond parallel in the annals of Canada, and perhaps unique in the recorded history of the world, occurred on the 29th April, at the mining town of Frank, situated in a valley which forms one of the approaches to the Crow's Nest Pass. The town, which was laid out less than three years ago by the Canadian-American Coal & Coke Co. (from whose president, Mr. Frank, it takes its name), had a population of between 800 and 1,000, largely employed in the company's coal mines, which were opened by a tunnel into the side of Turtle Mountain. This mountain, estimated by our correspondent to be 4,800 ft. high, with a summit 7,000 ft. above sea level, rises immediately above the town, its limestone cliffs being reared in places as perpendicular as the walls of a house. Loosened possibly by the unprecedented rains of the past year in that region, a section of these vast limestone cliffs, 4,000 feet long, and weighing millions of tons, broke away, and with awful noise and outbursts of flame, evolved by the grinding rock, covered the valley two miles wide, spreading out like a fan, and being followed by a back-wash of rock from the farther hills, like the action of a tidal wave. In its descent it overwhelmed a part of the village, killing over 60 people, and destroying all the company's outfit. The valley, for a breadth of 1½ miles, was covered with the fallen rock to a depth of from 50 ft. to 300 ft., the fragments of rock ranging from the size of apples to that of a seven-roomed house. The spur line of railway leading to the mine, and the main line of the C.P.R. for two miles was buried, the rails visible here and there being bent like hoops, and some of the telegraph poles being found butt-end in air.

The Old Man river, which ran through the valley at the base of the mountain, was diverted from its course, and a lake formed near the town by the dam of rocks. It was feared that the town would be inundated, but the water after rising for a distance, percolated through the rocks, and reached the valley to the east.

Some of the escapes seem miracles. A cottage occupied by Samuel Innes, with his wife and three children, was turned over three times, but the occupants were scarcely hurt. Another house was broken to bits, and seven of its occupants killed, but the eighth, a little baby, was found at day-break, a hundred yards from the site, in a crevice of a rock unharmed, except for exposure to the chill morning air. Alex. Leitch and his wife were killed in bed, but their seven months' baby was found unhurt. A number of men were in the mines, but providentially the mouth of the tunnel was not covered deeply, and owing to the courage of one or more of the men, they were able to work their way out.

Thos. J. Cooper, late on the staff of the Canadian Engineer, was in the town at the time, and to him we are indebted for the following graphic account of the disaster, with the accompanying rough sketch of the site.

Frank, Alta, April 30, 1903.

You will already have heard of the awful catastrophe that has visited our town. Thank God, we are all alive and well, though in the midst of the most terrible scene of devastation that I have ever witnessed. Yesterday morning at 4 o'clock, we were awakened by noises and tremors that baffle description. I can best give a faint idea of them by saying that noise as if a thousand express trains were tearing at full speed over the house-tops greeted our ears on awakening. Whether an eruption, earthquake or landslide occurred, I knew not, but as actual fact, the side of the Turtle Mountain, which overhangs the town, was heaved away by some titanic force from the rest of the body, and cast fan-shape in the valley below, covering with rocks and mud a space measuring roughly, a mile by a mile and a half, carrying death and destruction in its track, and completely altering the face and appearance of the surrounding country. Depressions in the land are filled up, and in some places debris is piled up to depths varying from 150 to 300 ft. high. Houses, with their slumbering occupants, were swept along from their foundations, or buried with the families inside, whose bodies will never again see the light of day. The Coal Co.'s stables, a huge building, containing at the time, over 40 horses has completely disappeared, leaving no vestige behind. The C.P.R. main track for a mile and a half is covered with huge rocks, some of which must weigh hundreds of tons, completely stopping all communication with the East.

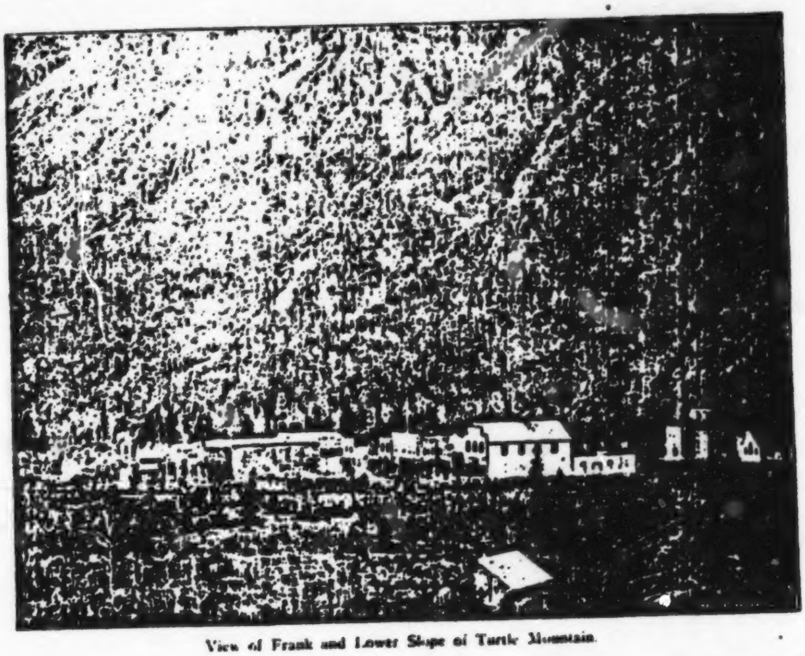
The Coal Company's weigh office, tipples, engines, new electrical plant, and entire works have absolutely disappeared, and not a sign of them or their location is visible; their sites being now occupied by a huge plain of rocks, in the centre of which is a small lake, about one-quarter mile long. The river course is completely blocked, and the lower portion of the town, and a lake is there rapidly forming, which, unless a new course for the river be formed by natural pressure or blasting, will ultimately submerge the greater portion of the town.

As far as can be gathered at present, nearly 100 lives have been lost, some entire families being killed. Even a mile and a half away, a camp of contractors' men engaged by Pouport & McVeagh, for the new C.P.R. track, is said to be buried beneath 100 ft. of rock, McVeagh himself being amongst the dead. A few bodies have been recovered, mangled and battered beyond description, and a few miraculous escapes are recorded; of the latter, an entire family were carried by the rocks about 200 feet in the house, which then fell to pieces, leaving the occupants battered and bruised, but living; the baby was found about 70 feet from the house alive and well. There has been a steady exodus ever since for towns further west. Rocks have been falling down from the mountain-side at short intervals since, increasing the fear and alarm of the towns-people.

The night weighman, poor fellow, is buried deep somewhere, and I myself should have been had the accident happened three hours later.

Of course, nothing is known as yet as to what will be done regarding the mine. The officials and owners will gather together as speedily as possible, and come to some decision. If that be against resuming work, this town will empty like a rocket. Even if it be decided to resume work, it will be quite a while before anything can be done, as a fresh start will have to be made, and the railway-track rebuilt and rearranged.

One promising feature, however, is the report of the miners who escaped from the mine last night after a terrify-



View of Frank and Lower Slope of Turtle Mountain.

DH

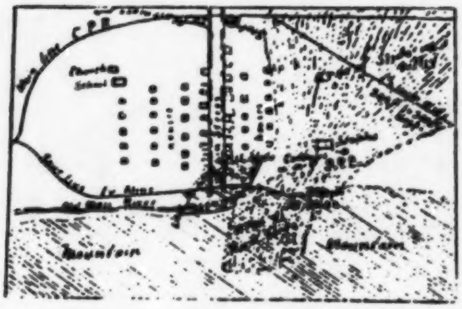
The Rockslide at Frank. Fragments of Rock Two Miles Distant from Foot of Mountain.

DH

ing imprisonment. They were given up for lost, as all the entrances and air-holes were buried, and we naturally judged they were buried in the interior of the mine. But, strange to say, though the inside of the mine was shaken and rocked violently, yet the workings are practically intact, and only two lives were lost; those seemingly being due to compression of air or shock. The horses inside are still alive and now being fed inside, as it is not possible to remove them under present conditions.

The report of the escaped men will, no doubt, have a favorable tendency with the owners when deciding the future.

The cause of the whole affair is evidently not due to mine gas; the general opinion is that generation of gas has been caused by water percolating into the limestone strata, of which the outer surface of the mountain is composed. This in time by compression, assumed such power as to dislodge the entire mountain side, and cause the present disaster. The death-dealing rocks are but three or four hundred yards from our door. I have drawn a rough sketch, showing the track taken by the falling rocks. Even at the furthest point away from the mountain, the rocks are piled up so high as to lead many to think that the whole valley was violently upheaved and overturned. We shall only know the cause after the scientific experts have visited us and made up their reports, as not a single soul that was working outside the mine is alive to give evidence. All is conjecture; and as this event is a new experience, at least for Canada, we shall probably soon have theories enough propounded to satisfy all the various opinions held on the subject.



Writing two or three days later, Mr. Cooper says: Owing to the dangerous condition of the mountain at Frank, another huge slide of rocks is threatening the whole town. Everyone was ordered out on Saturday, and the town is now absolutely deserted, the only living souls near being the police on guard. We had to leave at a minute's notice, and a four-miles' tramp across the mountains to the north of the town enabled us to reach the train waiting to go east. We had to leave, of course, just as we stood, the only things I brought being a brush and comb, and a loaf of bread! I am going to venture back possibly to-morrow, to get some bed-clothing, and whatever I can manage to carry—as no trains now go further west than Cowley. I anticipate quite a pleasant little trip, as I shall have to tramp and pack what I can on the pony.

One thing is certain, that however incorrect newspapers may be in detail, no report yet appearing has given any idea of the destructive energy of the rock-fall—only an actual sight can convey a true impression—and one must see the result from all sides before a true idea can be obtained.

A trail is being cut over the mountains, by order of Premier Haultain, who is on the spot; and a temporary track is being laid over the rocks by the C.P.R., but it must be weeks before either can be finished—meanwhile, the only access is by footpath across the mountains.

See page 154 for later report.

## HEATING AND VENTILATION OF SHOPS.

At a recent meeting of the New York Railway Club, an interesting discussion took place upon the subject of heating railway shops and other one-story buildings of the same nature. While such buildings are very simple in construction, they are not so simple as might appear in regard to the problem of effectively and efficiently distributing heat and air. On account of the large amount of roof, wall and window surface, the loss of heat is very great, and also, because of this and the relatively great height of the building considered as a single room, there is a tendency towards unequal distribution of the heat, the warm air rising to the roof and the cold air flowing to the floor, where it renders the workmen uncomfortable. It is important, then, not only that a sufficient quantity of heat should be delivered to the building, but also that it should be delivered where it will do the most good.

If an attempt is made to supply the heat directly by means of steam or hot water coils, the best results are not obtained. The vicinity of the coils is apt to be uncomfortably hot from the heat radiated directly therefrom, while places at a distance are disagreeably cold. The heat transmitted to the air of the room by contact and convection from the coils is largely lost, since the hot air rises vertically and imparts its warmth to the roof and skylights. It is also to be objected to this system of heating, that it makes no provision whatever for ventilation, the extended system of steam or water pipes is subject to damage by freezing during the coldest weather and steam pipes have been shown to be frequently the cause of fire where they come in direct contact with wood or other inflammable materials.

Owing to the reasons given above, the direct system of heating for work of this character seems to be falling into disfavor and is being superseded by the fan or hot-blast system. The apparatus required for the latter consists usually of a steam coil for heating the air, an engine or motor-driven fan for propelling the air through the heater and to its destination in the shop, and a system of piping or ducts leading it where it is needed. The heater will contain a considerable less length of pipe than would be required for direct heating, due to the higher velocity of the air over the pipe surfaces. The blower is additional equipment, but its use would be justified on the score of ventilation alone, something which is hardly considered at all in the direct system of heating. The exhaust of the engine is usually turned into the heater, thus obviating any loss from that source.

The distribution of the air by means of pipes should be so carried out that the lower part of the room is kept at a comfortable temperature, while at the same time no disagreeable drafts are produced. It has been found that by properly proportioning and directing the delivery flues most satisfactory results can be secured. Illustrating this point some very interesting examples were cited at the meeting mentioned above, by C. H. Gifford, of the B. F. Sturtevant Co., Boston. He said:

"In the first place, if you desire air or almost any other form of gas or substance at any particular place at any particular time, the best way is to provide a suitable conduit to deliver it there, and I would add, if there is any difficulty, which there may be, by air blowing on an individual workman, it is a simple mechanical detail to rectify it and, if you are unable to predetermine where the men or machines are to be located in a building, you can simply have an adjustable discharge opening from the pipe delivering the air, and if, perchance, it blows upon someone there generally is some space near the person to which the air can be directed and therefore cause no inconvenience whatever.

"As an example of what can be accomplished by distribution, I have in mind a machine-shop, that of the New York Shipbuilding Co., which as a machine-shop, is not dissimilar to one designed for railroad work. They have a building which I believe is about 1,200 ft. long, about 250 ft. wide, and 80 ft. high. The proposition was to heat one half of this building and leave the balance of it unheated. It was a problem that came to me, and I must say that I was to complete the system. These rails are placed on the market by Arthur Koppel, 66—68 Broad St., New York, the extensive manufacturer of industrial railway equipment, whose catalogue will be sent to interested firms.

Fred. A. McKay.

Fred. A. McKay, the winner of the prize offered by the publishers of the Canadian Engineer for the best essay by a student member of the Canadian Society of Civil Engineers, was born in Montreal, and entered McGill University from the high school, in 1899. He took the mechanical engineering course, and graduated this year, receiving the degree of B.Sc. He is now taking the electrical course. The essay, which appears in this issue, also took the college prize.

## ROCK-SLIDE AT FRANK.

(Continued from page [illegible])

Writing on the 25th May, our correspondent adds: Regarding Frank, there is nothing much to add. Reconstruction work is progressing, and the C.P.R. ran their first train through on the new track laid across the rocks, yesterday, so that the regular service will now be resumed, and we expect to return on Tuesday morning. At the mine, which is to be reopened as quickly as possible, the main tunnel is being cleared, and preparations for sinking a shaft are in hand. Up to this time all the workings have been above ground, in the interior of the mountain; the formations, strata and arrangements being similar to those prevailing in the Chestnut mines in Montana. Owing to the difficulties of approaching the old working, however, due to the disaster, a shaft is to be sunk some distance away, and underground workings will commence, while the approach to main tunnel will be reconstructed. The town has been declared open for habitation, and people are now flocking back, and the stores reopening, so that in a short time everything will be in full swing. Last week Sir Thos. Shaughnessy was in Frank, with some geological expert from Montreal, who declared unhesitatingly that the land-slide was preceded and caused by an explosion of coal gas, and the gas generated by lime combined. This was my own opinion, and is the only hypothesis tenable to account for the huge rocks as large as dwelling-houses, which are to be found at the fringe of the rock-covered area, from 2 to 2½ miles distant from the mountain base, it being inconceivable that a land-slide could force the rocks across the valley, and up the opposite slope some 60 or 70 feet high.

The summit of the mountain is split in many places, and frequent rock-falls occur, although nothing in the way of serious slides is anticipated. The lower end of the town is now under water, as the river-bed was filled up with debris and rocks, and the water has had to seek new levels and new exits. The miners' houses in that portion of the town are to be moved to a fresh site, and the town practically reconstructed.

A poor watchmaker named Fritz has sold a mechanical time fuse for projectiles to the Krupp Company for $96,000, and a royalty of one mark (25 cents), for each device used.

## FIRES.

The following fires have occurred in industrial works during the past month: Kootenay River Lumber Co.'s mill at Nelson, B.C., burned.——Matilda Mills, near Iroquois, Ont., belonging to M. T. Beach, burned.——Adams Bros. horse-collar factory, Toronto, burned.——Laing & Ritchie's planing mill, Essex, Ont., burned.——Storehouse of new locomotive works, at Longue Point, near Montreal, burned, with a quantity of lumber and other material, the destruction of which will delay work on the other buildings about a month.——Freeman Fertilizer Works, at Hamilton, damaged and a quantity of axle grease, varnish, etc., burned.——M. Beatty & Son's iron works, at Welland, damaged, and a lot of patterns burned.——Shaft-house, compressor plant and other buildings of Silver Mountain Mine, near Port Arthur, burned.——C.P.R. round-house at Hochelaga damaged, with three locomotives.——Saw mill of Royal Paper Mills, at East Angus, Que., burned, a pulp mill partly destroyed, some of the valuable machinery being saved.——Reddick's sash factory at Trenton, Ont., burned.——Workshop of A. Riddle & Son, plumbers, and stove dealers, St. Catharines, with machinery, burned, and stock damaged.——Manchester Mills, at Auburn, Ont., owned by Collis Bros., and operated by Geo. Towne, burned.——George Edgington's sawmill and cheese box factory, and John Kerr's brick and tile works, at Brownsville, Ont., burned.——Canadian Brewing Co.'s premises, Montreal, damaged, principally by water.——Keith & Fitzsimmons brass works, Toronto, damaged.——Warehouse and elevator at Seaport Mills, burned.——Factory of United Mineral Wool & Asbestos Co., at St. Henri, damaged. For drying the wool great heat is required, and it is blown into a room with a ventilator covered with a wire screen. The wool accumulated on the screen, and prevented the air from passing through, and the heat set fire to the pulleys and wood-work around the ventilator, doing considerable damage.——J. Matchett's evaporating factory, Waterford, Ont., burned.——Locomotive shops of Grand Trunk works, at Pt. St. Charles, damaged to extent of $2,500.——C.P.R. station, Ogilvie elevator, engine-house of Northern elevator, a number of cars loaded with lumber, and other buildings at Minnedosa, Man., burned.——Great fire at Ottawa, covering part of same territory burned three years ago, involving a loss of about $400,000, half of which was lumber belonging to J. R. Booth.——The Ottawa Electric Lighting Company lost about $3,000 in plant. The Electric Railway Company lost $3,500, of which $2,500 was on the Somerset bridge. Dominion Elevator Co.'s elevator at Nesbitt, Man., burned, with 13,000 bushels of wheat.——Fire at St. Hyacinthe, Que.; Cote's shoe factory, Duncan & Lamoureux's implement works, Bedard's implement works, Hamel & Co.'s machine shop, Morin's sash and door factory, Cote Bros. flour mills, Allair's grist mill, Hudon & Allard's machine shop, burned.——Foundry of the Northern Iron Works Company, on Point Douglas, Winnipeg, burned, plant almost new, loss $15,000.——Gordon & Keith's furniture factory, Halifax, burned.——Waterloo Works, St. Paul, Minn., in which Waterous Works, Brantford, are interested, and for the manufacture of gasoline engines, burned.——Robt. Mitchell & Co.'s brass foundry, at St. Cunegonde, Montreal, burned.——J. P. Newman's saw mill at Wiarton, burned.——About 100,000 feet of lumber in J. R. Booth's piling ground at Ottawa, burned; this is in addition to what was burned in the great fire mentioned above.

A new steam barge is being built by Lee Bros., at Wallaceburg, to be ready this month. She is being fitted with the engines taken from the burnt steamer Parry Sound, of Collingwood.

—As already mentioned, the Canada Foundry Co. has acquired the Northey pump manufacturing plant, and has removed it to the company's large new works, in progress in north-west Toronto. Mr. Northey will retain connection with the works under the new regime, and the services of Mr. Pell will also be retained for a specified time.

The Directors would point out that while there is a surplus on the Company's operations for these periods, after paying dividend on preferred stock of $309,612.[illegible] there have been expenditures on capital account amounting to $1,730,88[illegible], which expenditures in the case of the Steel Department were following out the general plan for the completion of the plant, and in the case of the Coal Department were chiefly for development work at the mines and for shipping facilities all of which have greatly enhanced the earning capacity of the Company's properties.

### STEEL DEPARTMENT.

The output of pig iron for the eight months was $148,399 tons or an average of 18,550 tons per month. The output of steel billets was 81,513 tons, or an average of 10,189 tons per month. The result of the operations of the Company so far is to prove that its plant is able to produce pig iron and steel, which meets the most exacting requirements of its customers. These include nearly all the important manufacturing plants in Canada and some of the largest locomotive works and plate mills in the United States.

### COAL DEPARTMENT.

The sales for the ten months amounted to 2,036,321 tons, an average of 203,632 tons per month as compared with 2,276,270 tons for the corresponding ten months of the previous year, an average of 227,627 tons. Development work has been fully carried out and the prospects for the present year are excellent.

Notwithstanding the unfortunate fire at Dominion No. 1 Colliery in March last, now it is believed extinct, the output from January 1st to May 1st in the current year is 986,097 tons as compared with 801,714 tons in the same months of 1902.

**Financial Statement ending December 31st, 1902**

| | | |
|---|---|---|
| Earnings Coal Department 10 months | | $1,977,328 10 |
| Less 10 months rent | | 1,333,333 33 |
| Net | | $643,994 77 |
| Earnings Steel Department 8 months' | | 309,806 90 |
| Total | | $953,801 67 |
| *Less*— | | |
| Bond Interest 8 months' | $265,376 94 | |
| General Interest 8 months' | 112,225 17 | |
| Sinking Fund 8 months' | 33,333 34 | |
| | | 410,935 45 |
| Net Operating Earnings | | $542,946 22 |
| *Less*— | | |
| Preferred Stock Dividend, 8 months' | | 233,333 34 |
| Surplus | | $309,612 86 |

ASSETS.

| | | |
|---|---|---|
| Property | $33,465,257 17 | |
| Cash and Accounts receivable | 2,491,675 23 | |
| Raw and Manufactured Material on hand | 2,229,072 82 | |
| Insurance Taxes S. S. Hire, &c., paid in advance | 32,896 01 | |
| Coal Rental, 2 mo. paid in advance | 266,666 67 | |
| | | $38,485,567 90 |

LIABILITIES.

| | | |
|---|---|---|
| Bonds | $7,956,000 00 | |
| Common Shares | 20,000,000 00 | |
| Preferred Shares | 5,000,000 00 | |
| Cape Breton Real Estate Debentures | 360,880 00 | |
| Dominion Rolling Stock Debentures | 672,879 96 | |
| Mortgages | 72,000 00 | |
| Notes and Accounts Payable | 4,274,733 26 | |
| Interest, Dividends &c., accrued and not due | 205,460 85 | |
| Contingent Fund | 66,991 95 | |
| Profit and Loss | 309,612 86 | |
| | | $38,915,567 90 |

### CAPITAL EXPENDITURE.

| | | |
|---|---|---|
| Expended for new construction Steel Department, for 8 months from May 1st, 1902 to January 1st, 1903 | | $1,064,626 46 |
| Expended for new construction Coal Department for 10 months from March 1st, 1902, to January 1st, 1903, as follows: | | |
| At Collieries | $631,714 74 | |
| At Montreal | 9,441 02 | |
| At Quebec | 900 21 | |
| | | 641,260 97 |
| | | $1,705,887 43 |
| Other Capital Expenditures as follows: | | |
| St. John Wharf Property | 100,000 00 | |
| Sydney and Glace Bay Railway Capital Stock | 125,000 00 | |
| | | 225,000 00 |
| | | $1,730,887 43 |

## DOMINION COAL.

The following report was submitted to the shareholders at the annual meeting held at Montreal on the 14th instant.

"By the terms of the lease entered into between this Company and the Dominion Iron and Steel Company, Limited, which was duly ratified and approved by the shareholders of both companies, the latter Company has leased the entire property of this Company for a rental of $1,600,000, payable quarterly, having entered into possession thereof as at 1st March, 1902.

In order that the fiscal years of both companies should coincide, it has been deemed expedient to alter the date of the close of the fiscal year of this Company from 28th February to 31st December in each year; and accordingly the present report embraces a period of only ten months.

Dividends at the rate of eight per cent. per annum have been paid on the Common Stock of the Company commencing 1st April; dividends on the Preferred Stock and interest on the bonds of the Company and general expenses have also been paid, leaving a balance of $64,859.88 to be carried forward.

**Annual Statement for Ten Months ending December 31st, 1902.**

ASSETS.

| | | |
|---|---|---|
| Property Account | $20,526,256 04 | |
| Sinking Fund Investment ($111,800 U.S. 4s. coupons) | 124,817 60 | |
| Sinking Fund Cash (deposited with New England Trust Co.) | 8,298 89 | |
| Cash under Art. IV. (deposited with New England Trust Co.) | 6,792 95 | |
| Notes receivable (Dominion Iron and Steel Company, Limited) | 305,000 00 | |
| Cash | 6,141 07 | |
| | | $20,977,306 55 |

LIABILITIES.

| | | |
|---|---|---|
| Common Shares | $15,000,000 00 | |
| Preferred Shares | 3,000,000 00 | |
| First Mortgage Bonds ($4,500 drawn, not yet presented for payment) | 2,594,000 00 | |
| Rent (January and February paid in advance) | 266,666 67 | |
| Bond Interest (accrued September 1st to January 1st) | 51,780 00 | |
| Profit and Loss | 64,859 88 | |
| | | $20,977,306 55 |

PROFIT AND LOSS.

| | | |
|---|---|---|
| Ten Months' Rental | $1,333,333 33 | |
| Interest | 28,007 78 | |
| | | $1,361,341 11 |
| *Less*— | | |
| Preferred Stock Dividend 10 months' | $200,000 00 | |
| Common Stock Dividend 9 months' | 900,000 00 | |
| Bond Interest 10 months' and Premium on bonds redeemed | 143,986 55 | |
| General Expense 10 months' | 52,494 68 | |
| | | $1,296,481 23 |
| Balance | | 64,859 88 |
| Sinking Fund for 10 months' | 130,824 50 | |

## The Frank Disaster.

(By W. Blakemore, Fernie, B.C.)

One of the most terrible and unique disasters which has ever overtaken a little town occurred at Frank on the 29th ult., furnishing a result which cannot be adequately described in words and must be seen to to be believed. With the picturesque and sensational aspects I have nothing to do. There is however a side of the case which is of great public interest and especial interest to your readers and with that I purpose to deal.

A word may be said as to the area affected and the terrific force generated by the mountain slide. The dislodged rock spread itself out fan shaped across an area of 1,000 feet and extended for a mile and a half to the north of the mountain. From east to west across the broadest part of the slide measures two miles, and I estimate that the average depth of rock spread over this whole district is 30 feet. Taking this calculation by the size of the cavity left on the mountain side, which is approximately 25,000 feet long, 2,000 feet high, 200 feet thick, it will be seen that upwards of 100,000,000 tons of rock have been dislodged. Estimating certain natural conditions, and taking a mean height of the fall at 3,000 feet a careful mathematical calculation will show that the fall generated a force equal to one thousand million horse power generated continually for two months. I make this calculation simply to show that the force is one which the imagination fails to grasp and which sufficiently explains how it was possible for the whole mass of rock to be transferred nearly two miles on an elevation 300 feet higher than the base of the mountain. It also explains why the packing of the rock was so solid, this being due not only to the tremendous force generated, but to the resistance offered by the rapidly rising ground.

The special aspect to be solved, which is of importance to the mining world, is the consideration of the evidence afforded as to the cause of this truly terrific disaster. In order to arrive at this I made a careful examination of the scene after the disaster, and also had the advantage of a personal interview with some of the imprisoned miners, with experts who have been upon the ground since the occurrence, and with residents of the town, and I am able to form a fair statement of the cause. The first impression, as telegraphed on the morning of May 1st, attributed the calamity to a volcanic explosion or possibly to an earthquake. Probably from the inherent possibility of either theory the facts of evidence veto both suggestions. The former theory was abandoned within a few hours, there being not the slightest shred of evidence to support it, and it being absolutely an invention of the fertile brain of a penny-a-liner. The earthquake theory is attributed to the fact that the slide in its rush produced a concussion in the air and a loud report but this is sufficiently accounted for when the mountain is viewed in broad day light, and the fact that there were no rumblings or tremors and that not a pane of glass was broken in the town is sufficient evidence that this theory must be abandoned. When such a gigantic land slide occurs it demands absolute evidence, and if we find all the conditions necessary to account for the result produced, then to seek for any fantastic theory is to ignore the obvious for the obscure. I find an unanimity of opinion that the slide was induced, if not produced, by the mining operations of The Canadian American Coal Company, and for reasons, which to my mind appear quite clear, I have to endorse this opinion. We will first take evidences of the surface, which would seem to account for this cause, with its effects. The slide is adjacent to the workings of the mine. These workings were carried on in a seam of coal fourteen feet wide and practically vertical. The seam ran parallel with the mountain, N.W.S.E., and had crept along the lower half of the mountain at an elevation ranging from 200 to 1,000 feet. The lower half of the mountain was covered to a depth varying from 20 to 50 feet, with debris. Behind and above this the mountain towers almost perpendicular. It will thus be seen that the coal seam formed a natural support or toe for the foot of the mountain and that the removing of it would have a similar effect to the cutting away of the lower edge of the mud slide or the partial under cutting of the face of coal. This process had been continued for a longitudinal distance of about three quarters of a mile and to a vertical height, above the main entrance, to approximately 900 feet. When the slide came away the upper part of the workings were carried with it and the imprisoned miners dug their way, through the fallen rock, at a point 190 feet from the entrance of the mine. Where originally the cover was more than 500 feet the length of the slide across measures exactly with the length of the workings from which the gravel has been extensively removed. Assuming that the removing of the natural barrier was the cause of the mountain giving way established the connection between the workings and the slide.

The next important evidence is that a series of crevices were discovered by the experts who ascended the mountain shortly after the slide. One of these crevices is described as being more than one thousand feet long and fifteen feet wide at the top, and the depth so great as to be unmeasurable. A miner, none other in fact than a well known Nova Scotian, informed me that when hunting on the top of Turtle mountain last fall he found several crevices running lengthwise behind the present slide and that they were then wide enough to necessitate his jumping in order to cross them. Some of the imprisoned miners told me that for many months past they had heard rumblings in the mine and that these rumblings were not produced in the seam, but evidently further back. They state further two very important facts, namely, that there was a "squeeze" throughout the mine which frequently buckled and burst the timber set in one night. The sets were from 20 inches to two feet square. The other most significant fact which they relate is that enormous flakes of rock had been forced from the wall next the mountain into the seam. One piece which they measured several months ago was 80 feet by 15 feet wide and five feet thick. It is certain that such a rock burst as this could only have resulted from an incipient slide. If to these circumstances be added the statement of the same men that knew the system of working adopted that there was vertical man way from 300 to 400 feet, the pillar of either side of it 20 feet wide, and that between these points the whole of the coal was breasted out, it is easy to understand from these assumptions how conclusive the other evidences are as to what actually occurred. The whole thing may be summed up as follows: The removal of the natural support by the system of working which left a very small percentage of solid coal to protect the walls. The slight but gradual crumbling of the strata on the hanging wall of the mountain side evidenced by rumbling and the enormous breaking away of flakes of rock. Finally the production of enormous crevices at the back, with the continual diminishing of the support until either by a natural process of disintegration or as a result of some sudden shock in the mine, such as a blast, it moved away in a moment carrying death and destruction in its wake. As far as I am able to judge, any other explanation enforces improbabilities if not impossibilities.

Taking all the conditions into account I do not think it possible to work this coal safely by any system as the texture of the limestone in the mountain is such that the slightest interference with it would surely bring it down. The slide has left a very singular looking peak immediately behind the town, and at the back of this peak is a deep crevice. I assume the common opinion that this peak will fall. It will probably do so within a year or two in consequence of the rain and snow filling the crevices and after loosening the rock it will certainly do so if assisted by any artificial movements of the strata.

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## THE GREAT ROCKSLIDE AT FRANK, ALBERTA.

By Wm. Pearce.*

The village of Frank is situated in southern Alberta, on the Crow's Nest Pass division of the Canadian Pacific Ry., a few miles east of the Crow's Nest Pass. On the morning of April 29 last the village was visited by a disaster, the news of which was sent all over the civilized world. The first reports stated that a volcanic eruption had occurred, but investigation showed the calamity to have been due to a slide of rock from the adjacent mountain of a magnitude which has seldom if ever been witnessed.

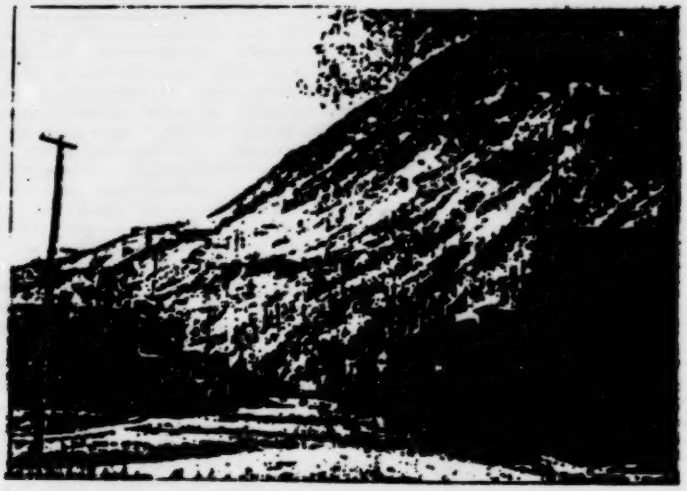

FIG. 1. DOMINION AVE. AND SIDE OF TURTLE MOUNTAIN AT FRANK, ALBERTA, BEFORE THE SLIDE OF APRIL 29.

The disaster at Frank occurred at 4.10 in the morning. Nearly all of those killed were asleep, and probably never knew what occurred. They were buried under such a mass of rock that death must have come instantaneously. Twelve bodies were recovered, being taken out of the sides of the slide; the balance were buried so deeply that there was no hope of recovery. In fact, owing to the pushing which incidentally accompanied the slide, it was impossible to know where to look for them. The total number killed was 66; of them, 8 were women, and 30 children, leaving 28 men; of the killed, 21 were miners; the balance was engaged in various occupations, some farmers or ranchmen, others merchants, etc. Within the town of Frank itself only six buildings, miners' cottages, were destroyed, and one badly injured. Outside the village some ten buildings were covered by the rockslide and destroyed.

There was apparently no very great rush of wind with the slide except immediately in front of it. It is probable the slide was very deep in the center. The fanning out was by reason of following the line of least resistance, and a flattening which would take place naturally.

On the edge of the slide some very peculiar movements are discernible. Thus, a portion would strike a bank or ridge and would curve off to one side or another until its course would be deflected perhaps 120° from its original direction. This and the action which this deflection took in the way of throwing sand, gravel, sticks, and one thing and another, led many to believe that a large amount of this slide had been hurled through the air.

About 1,000 acres of land to the north and east of the Crow's Nest River (better known locally as the Middle Branch of the Old Man), was covered by the slide to a depth averaging probably 30 ft. In some places it was estimated to be 100 ft. deep. Directly on the toe of the slide are to be found rocks which came from the top of the mountain. Many of them had never turned over, as was evidenced by ferns and moss growing on them. There are one or two rocks which had traveled two miles from where they left the mountain side, and which have a bulk of nearly, if not fully, 1,000 cu. yds. The highest points of the slide have the larger rocks, the smaller ones being invariably found in the lower places. In one case was noticed a rock containing at least 1 cu. yd. thrown at least 100 ft. in front of the toe of the slide through the air, and landed probably 20 ft. higher than its point of leaving the slide. It was probably lying loose on the top of a large boulder which grounded, and the momentum of this smaller block carried it this distance ahead.

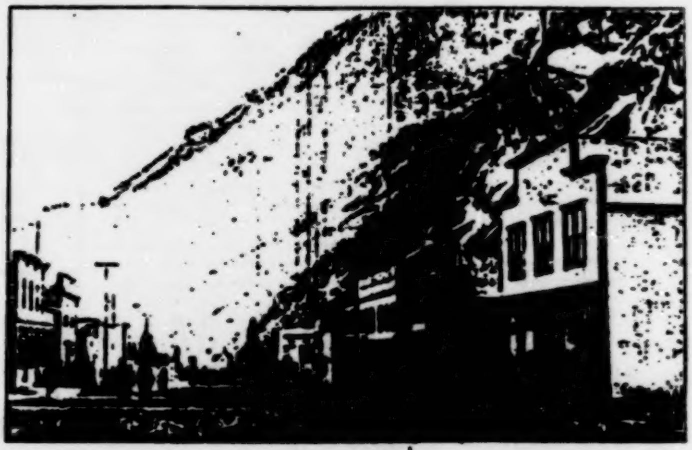

FIG. 2. VIEW FROM NEARLY THE SAME POINT AS IN FIG. 1, TAKEN AFTER THE SLIDE.

(The entrance to the coal mine which was closed by the slide is at the point marked X. In the foreground is the party of 17 miners who dug themselves out after 13 hours of imprisonment, being escorted back to the town.)

The river channel was blocked to the depth of probably 20 ft. Fortunately, at that point the stream had a fall of possibly 70 ft. per mile, although the average fall probably does not equal 50 ft. to the mile. Thus the blocking caused no material damage by damming back the water. The stream is not a large one, and at the time of the disaster was probably not carrying over 100 second-feet. The stream even when in flood is not large, and probably does not exceed 1,500 second-feet. Its drainage area above Frank is comparatively small. Thus danger from this source is not very great.

The Canadian Pacific Ry. track was blocked for about a mile and a-half, and that company is now busily engaged constructing a temporary line over the slide. The company was starting to change their line at that point, carrying it around adjoining the river channel, thereby obtaining better grades. If the contractor had been a day or two sooner on the ground, he probably would have had his party or a portion of it camped under the slide.

A small railway party which had been engaged in the construction of a road in from the Canadian Pacific Ry. line about a mile below Frank to the north, on Gold Creek, a distance of about five miles, was buried. Where the camp stood there is said to be about 75 ft. of rock. This branch line of road is owned by a French company, known locally as the Lille Colliery Co. They have their track covered by rock for 1½ miles to an average depth of 60 ft.

The slide after crossing the valley went up the opposite slope at least 400 ft., and probably 500 ft. above the river bed. The height of the mountain above the river bed, from which the slide came, is approximately 2,000 ft. The top of the mass which broke loose and came down was probably 1,600 to 1,800 ft. above the bed of the stream. The detached portion left a perpendicular face estimated at 300 to 500 ft. in height. Its length is probably about 2,000 ft. and its width on the top 500 ft. As the highest point of Turtle Mountain was adjacent to the northeast face, and as it sloped from it towards the southwest at a dip of probably 45°, it will be noticed that the front portion of the slide was considerably higher than the rear. In addition to the rock that is piled up to the northeast of the Crow's Nest River, there is heaped on the slope of the mountain on the opposite side of said stream, probably half as much more. The above will give some idea of the quantity of rock that moved.

The length of time that the disturbance took place is estimated at from one to four minutes by persons who witnessed the disaster. Many of them honestly declare that it was volcanic; that the action commenced where the toe of the slide now is; and that it was the vibration that made the mountain side break loose. Where the town of Frank stands there is very little soil overlying the sandstone, and there was no doubt very great vibration.

The Canadian-American Coal Co. were the chief property hours. The houses destroyed at Frank were owned by them, and they lost their tipple, power house, barns, stables, and all the works; and not only the machinery installed, but a large amount of new machinery, to the amount, it is said, of $150,000, recently arrived awaiting almost immediate installation. This was lying near the mouth of the tunnel, and it came in the path of the slide and was totally destroyed.

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*Chief Inspector of Surveys, Calgary, Alberta.

At the time of the disaster there were only 17 men in the mine, and they all escaped, after being 12 hours imprisoned. These men were employed at repairs, looking after the timbering, ventilation, etc., and not doing actual mining, as the disaster occurred at an hour when the miners proper were all out of the mine. Fortunately, among the men imprisoned in the mine there was one man who took charge of them, and who appears to have kept remarkably cool, and displayed a great amount of intelligence and good judgment.

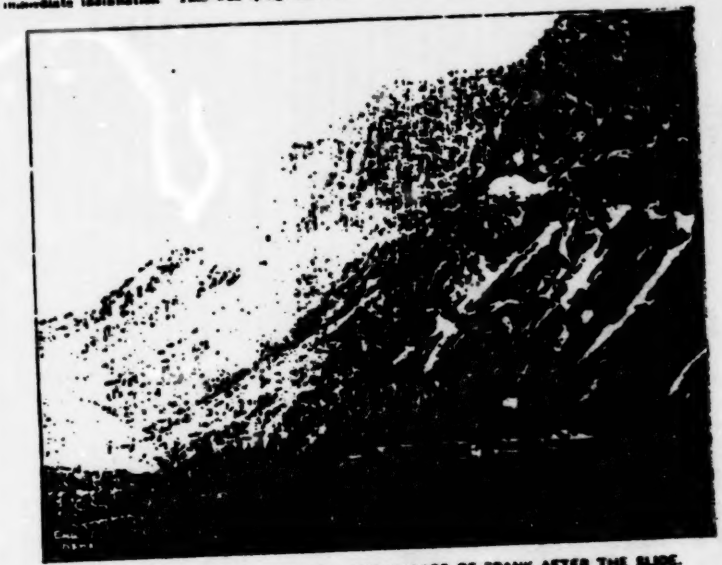

FIG. 3. VIEW OF TURTLE MOUNTAIN AND VILLAGE OF FRANK AFTER THE SLIDE.

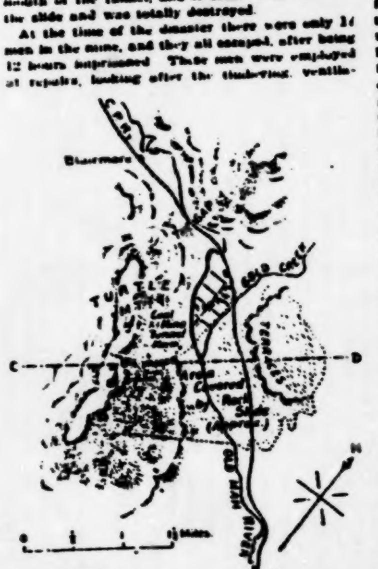

Fig. 6. Sketch Map of Rock Slide on Turtle Mountain, Frank, Alberta.

As soon as he heard the shock he knew that something was wrong, and he went and hunted up all the men in the mine, some of whom were at the extreme end of the tunnel, 2,000 ft. further in from the entrance than he was. The total length of the tunnel was 6,000 ft. He gathered them together and they started to go out to the mouth of the tunnel. They found considerable coal had broken loose from the pillar immediately above the tunnel; and also that the timbers from side to side of the seam lying both on the floor and on the roof had either buckled or crushed. They had no difficulty, however, in working their way out until they approached to within 120 ft. of the mouth of the tunnel, when they found it was blocked. The leader then returned to where he had been when the shock took place, namely, about 4,000 ft. in from the mouth of the tunnel, and about 400 ft. above it. He found that whereas when he had left there was 8 ft. width where the coal had been taken out of the seam, the sides had come together so that he could hardly squeeze himself in. His object in returning to this point was he hoped he might possibly reach an air shaft which was a short distance away. Despairing of doing so, he then returned to near the mouth of the tunnel, and they dug out for some 30 odd ft. until they struck an air shaft. Fortunately this air shaft was not large, and struck the tunnel about 70 ft. from the surface; the rocks in it were not so large but that they could handle them. They were able to take them out and then reach the outside, which they did about 12 hours after the accident occurred. In the meantime, their friends outside had despaired of ever seeing them, and were afraid, on account of the rock coming down, to approach this portion of the slide.

The coal seam on which this company was working has an average width of about 14 ft., and in some places, owing to folds, had a width of 30 ft. It kept its course remarkably well. The tunnel was taken out to the full distance of the average width of the seam and had a height of probably 8 ft., well timbered. Immediately above this tunnel there was a pillar of coal 25 ft. wide left with chuteholes through it every 50 or 60 ft. Above that, the greater part of the coal was taken out up to the surface. The depth of coal lying over this pillar, a short distance in from the mouth of the tunnel, was 400 ft.; and at 4,000 ft. in, it was 800 ft. The rockslide did not extend beyond where the coal had been taken out. This coal, owing to the upthrust of the limestone in past ages, had been thrown up until it was 5° beyond the vertical. This coal company commenced operations about two years ago, and for the past year has had an output of from 800 to 1,000 tons per day. Nearly if not all this output has been taken by the Canadian Pacific Ry. for locomotive purposes, and the railway has been greatly inconvenienced by this source of supply being so suddenly cut off.

It is understood that the coal company purposes resuming operations. If the tunnel can be repaired, it will be used for access to and egress for the coal lying to the southeast, beyond the slide. In addition, it is the intention to sink a slope or shaft in Frank adjacent to the railway, and go further down on the same seam and mine therefrom.

No tests have as yet been made to ascertain how much further down this seam holds its present dip. It is evident that it changes eventually, and in course of time finally assumes a horizontal, and then takes a reverse upturn. This field is peculiar in that respect, and consists of several seams varying from 4 ft. to upwards of 30 ft. in thickness, and lying parallel to and at no great distance from each other, so that they all can be readily attacked from one point. It is claimed to be part of the same field lying to the west of the summit of the Rocky Mountains, in British Columbia, known as the Crow's Nest Pass coal field. If that contention be correct, then it undoubtedly follows that it is a portion of the greatest coal area known, not only in the total thickness of seams, but in the area covered by it.

For upwards of a year after mining operations were commenced here, the naked light was solely employed in the mine. Since then gas has been struck, necessitating the use of the safety lamp. A few minor explosions have occurred, nothing, however, very serious.

Calgary, May 15, 1903.

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Since the above was written the report has reached me (and I believe it to be reliable), that Messrs. McConnell and Brock, of the Canadian Geological Survey, who are examining the mountain, have given out alarming reports regarding the peak lying to the northwest and adjacent to the recent slide; that recent and alarming fissures are manifesting themselves behind this peak which leads them to the conclusion that it will come down shortly. It is also reported that they have advised the movement of the town site of Frank for some distance.

The first alarm with reference to the probability of further and disastrous slides arose out of the fear that this peak might come down. The examinations then made, however, led to the conclusion that there was no danger at this point, but that there was danger from material in the rear of the first slide. Fear of trouble from this source seems to have passed away, however, the slides or breakouts having been of minor importance.

If, however, the peak now overhanging the mine comes down in a large mass, it will probably

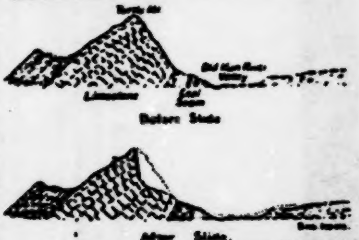

Fig. 7. Sections of Turtle Mountain Before and After Slide (on Line, C. D., Fig. 6).

(The contorted structure of the affected portion of the mountain is shown by diagrams as [illegible] of the carboniferous limestone upon the [illegible] edge of the coal bearing cretaceous rocks. [illegible] the softer cretaceous shales and sandstones. [illegible] is very common in the Canadian Rocky Mountains proper. The remarkable point is [illegible] of similar character are apparently rare; [illegible] the evidence would still be present for [illegible].)

to quartz monzonite. Associated with some of these batholiths as marginal facies, as small stock-like masses, and as dikes cutting both igneous and sedimentary rocks, are rocks of aplitic habit characterized by the presence of lime-soda feldspar usually in excess of alkali feldspar, a diopsidic pyroxene, and abundant titanite. Some contain scapolite; in one instance this mineral formed about 20 per cent. of the rock. In this rock the scapolite encloses all the other minerals and interpenetrates with all but quartz and the minor accessories, so that there is no doubt of its primary character. Chemical analyses of two of the scapolite-bearing rocks show the remarkable combination of rather high $SiO_2$, low MgO and iron oxides, with high CaO and $Na_2O$; chlorine is more abundant than in most rocks. It is surmised that these unusual rocks have been formed by the solution of limestone in magmas of aplitic composition containing abundant chlorine. No partial stages of the assimilation have been observed, and it probably took place at great depths.

*On the Origin of Peat:* CHARLES A. DAVIS.

Peat deposits are formed: (1) in depressions below the ground water level, (2) on poorly drained land areas where the ground water level is near but usually below the surface. Deposits on slopes in regions of high atmospheric humidity and on subsiding coasts are included in (2).

In (1) the peat is formed mainly from aquatic plants, including microscopic algæ, the true aquatic higher plants, and a little drift material from the shores. As the peat approaches the water surface, amphibious plants, particularly sedges, other herbs and shrubs, grow out over it from the shore, and form a partly or wholly floating mat, which, later, is invaded by terrestrial plants, including sedges, grasses, ferns, shrubs, sphagnum moss and trees, in the order given. The time when each type appears depends on the height of the surface of the mat above the average water level. Peat formation may go on until the basin is filled, or its surface covered.

In (2) the plants forming the peat are mainly terrestrial, but the types chiefly contributing are controlled by the average height of the ground water level, and climatic conditions. If the ground water level rises with the peat, the entire deposit may be homogeneous, and formed by the same kind of plants; if it remains fixed, the bed is generally thin and varies from bottom to top; if the water rises periodically, the deposit is heterogeneous, with beds of the same structure repeated at intervals.

Decomposition of vegetable matter into peat is principally due to the activities of organisms, the most important being aerobic, hence the top strata of wet peat beds are usually most thoroughly decomposed.

*The Landslide at Frank, Alberta:* L. D. BURLING.

At 4:10 A.M., April 29, 1903, an amount of rock variously estimated at from 60,000,000 to 100,000,000 tons dropped away from the northeast face of Turtle Mountain, fell through a maximum vertical distance of 3,000 feet, and covered over a square mile of the valley bottom to an average depth of thirty to fifty feet. The slide wiped out the tipple work and buildings of a coal mine at the foot of the mountain, demolished eight houses and a number of smaller shacks and tents, destroyed about two miles of railroad track and killed about seventy people.

Turtle Mountain is an isolated mass situated just south of the Canadian Pacific Railway east of the Continental Divide between British Columbia and Alberta, and towers 3,000 feet above the town of Frank, which lies at its base. The upper part of the mountain is composed of massive upper Paleozoic limestones which dip westward at angles of 20 to 30 degrees. These limestones are thrust over nearly vertical shales and sandstones of Cretaceous age containing a workable coal seam twelve to sixteen feet thick. The strikes of the massive limestones, the thrust plane and the coal beds are very nearly parallel, and for a distance of three quarters of a mile (entirely across the face of the mountain) and for a vertical height of 300 to 400 feet, the entire coal bed had been either loosened or completely withdrawn.

The slide affected only the limestones above the thrust plane. The horizontal distance between the present crest of the mountain and the toe of the slide is nearly two miles, the maximum vertical difference 3,000 feet and the vertical distance between the crest and the toe 2,525 feet. The slope from the crest of the mountain to the lake at its foot is 32 degrees, the first thousand feet having a slope of about 65 degrees. From a width of 2,000 feet at the crest the talus has a width of nearly a mile at the lake, and with minor variations this width is continued to the hills opposite, a mile away.

Whatever may have been the immediate cause of the disaster—the period was one of frequent and marked alternate freeze and thaw, and seventeen men were at work in the coal mine at the time—cracks had been noticed on the back slope

of the former precipitous peak and the slide may have been brought about by some, if not most, of the following contributory causes: (1) the massive limestones forming the upper two thirds of the mountain had been thrust out over the underlying softer shales and sandstones, and therefore may have been in a state of more or less unstable equilibrium; (2) a considerable layer at the base of the massive limestones had been brecciated by the thrust faulting and had thus lost its homogeneity and competency; (3) the limestones forming the upper part of the mountain were very massive and thus more liable to accumulate strain and to give way in a body than would have been the case with weaker rocks; and (4) the opening up of so thick a coal seam, to such a height and for so long a distance in a direction perpendicular to the dip of the massive overlying beds, in rocks incompetent to withstand the pressure thus induced, created strains in the massive rocks from which the support had been removed.

PHILIP S. SMITH,
*Secretary*

AT the 217th meeting of the society, held at the Cosmos Club on Wednesday evening, March 24, 1909, under informal communications, Dr. J. W. Spencer presented briefly some notes on the "Recent Draining of Niagara Falls."

### *Regular Program*

*The Composition of Stony Meteorites:* GEO. P. MERRILL.

The average of a large number of analyses of stony meteorites shows close agreement, after the elimination of the metallic iron, with terrestrial peridotites. From a magma of this kind no amount of magmatic differentiation could produce a series of rocks so rich in silica, alumina, lime and alkalies as those shown by the averages calculated by Clarke and Washington to be characteristic of the earth's crust. World origin through the segregation of materials of this nature is therefore impossible. At the same time it may be conceived that the relative proportion of the elements which make up the mineral matter in the various bodies wandering in remote space, varies widely. If this is so, the earth to-day, in its course, may be passing through and receiving from space deposits of material representing one and the same original body, but not necessarily resembling, in percentage composition, the materials which reached it during past and earlier stages of the earth's history. In brief, the stony meteorites may be regarded as products of an extremely basic phase of magmatic differentiation from a previously more acid magma.

*Chemical Composition as a Criterion in Identifying Metamorphosed Sediments:* E. S. BASTIN.

Chemical criteria need seldom be resorted to for the identification of metamorphosed sediments of a highly siliceous or a highly calcareous nature. They are inapplicable for the identification of many of the metamorphic equivalents of the arkoses, greywackes and similar rocks, since these may be almost identical in composition with the igneous rocks from which they have been derived. Chemical criteria are also inapplicable in the recognition of flow gneisses and of injection gneisses. Such criteria are therefore restricted in their usefulness for the most part to the differentiation of metamorphosed equivalents of the argillaceous sediments from metamorphosed plutonic and volcanic rocks.

The available analyses of metamorphosed igneous rocks show that well-developed foliated structures may in many cases be developed without important chemical changes, and it seems probable that in a very large number, if not in most, of the metamorphosed igneous rocks with which the geologist has to deal the chemical changes during metamorphism have not been severe enough to obscure their igneous characters. They are in many instances still igneous rocks in composition, and the chemical criteria for distinguishing them from metamorphosed sediments may be brought out by a comparison of the latter with normal igneous rocks as tabulated in Washington's tables of analyses.

The chemical characteristics of the argillaceous sediments and the changes they undergo during metamorphism may be determined by a comparison of the averages of a large number of analyses of clays, shales, slates and schists. By comparing these sedimentary averages with the igneous rocks as tabulated in Washington's tables of rock analyses, the following chemical characteristics are shown to be suggestive of sedimentary origin.

1. Excess of alumina ($Al_2O_3$) above the amount necessary to satisfy the ratio of 1 to 1 with which it is normally combined with lime and alkalies in igneous rocks.
2. Excess of magnesia over lime ($MgO > CaO$).
3. Excess of potash over soda ($K_2O > Na_2O$).
4. In some instances, excess of silica ($SiO_2$) has confirmatory critical value.

The evidence of sedimentary origin is greatly form an avalanche about a quarter the size of that first, and if it takes a course parallel to the first, most, if not all of Frank will be buried. It may happen, however, that its course may be across the former slide, or it may come down in such small portions that little or no damage will ensue.

The condition is particularly hazardous and there seems to be nothing to be done but to watch and wait. The jar which took place from the first slide, owing to the configuration of this mountain, may have caused fractures which may extend for a very considerable distance from it, and it may take a considerable time before all disturbances caused by the first slide cease.

## OFFICIAL INVESTIGATION OF THE FRANK DISASTER BY THE GEOLOGICAL SURVEY OF CANADA.

Immediately on receipt of the news of the disaster at Frank, Alberta, the Geological Survey of Canada commissioned two of its staff, Messrs. R. G. McConnell and R. W. Brock, to investigate the occurrence. Through the courtesy of Hon. Sir Wm. Mulock, Acting Minister of the Interior, and Mr. J. F. Whiteaves, Acting Director of the Canadian Geological Survey, we have been furnished with a summary of the preliminary report on the disaster, submitted by Messrs. McConnell and Brock, and print it in full as follows:

Turtle Mountain, the scene of the late disastrous rock avalanche, forms part of the most easterly or front range of the Rocky Mountains. It is a long narrow ridge with steep slopes on both sides surmounted by a number of rock peaks, the highest of which have an elevation of rather more than 3,000 ft. above the valley of Old Man River, or 7,000 ft. above the sea. Close to the foot of Turtle Mountain, at the point where Gold Creek enters Old Man River, is situated the town of Frank, an important coal mining center on the Crow's Nest Branch of the Canadian Pacific Ry.

The base of Turtle Mountain consists of beds of cretaceous shales and sandstones; the precipitous upper portion consists of beds of Devonian limestone, the line of separation being the plane of a thrust fault, along which the limestone has over-ridden the cretaceous rocks. During this process the lowest beds of the "limestone" are highly contorted and crumpled.

In addition to the dangerously steep slopes, the shattering due to faulting and the easy separation of rock masses along bedding planes, Turtle Mountain was further weakened by several sets of jointing planes which traverse it in various directions.

At dawn on the 29th of April a great slice of Turtle Mountain, one-half a mile long, over 2,000 ft. in height, and of great thickness, including the main central peak over 3000 ft. above the valley, precipitated itself with terrific violence into and across the valley below, overwhelming everything in its course. The debris, consisting of fragments of limestone, together with sediments ploughed up from the beds of Old Man River and Gold Creek, now covers the valley to a depth of from 3 ft. to over 30 ft., over an area of two square miles. In its movement the debris resembled a fluid, flowing across the valley a distance of two miles and ascending the terraces on the opposite side of the valley to a height of 400 ft. above the Old Man River bed. About 70 lives were lost and much property was destroyed.

The disaster was due to a combination of causes, cumulative in their effects. The chief of these was the structure and condition of the mountain. Exceptional atmospheric conditions were also important factors. The precipitation during the last few years has been abnormally heavy. The days preceding the slide were excessively hot, causing rapid melting of the snow on the mountain, and allowing this water to find its way into the numerous joint planes and fractures. The night of the disaster the temperature fell to zero, causing all water to freeze and expand. The mountain was further weakened by opening up large chambers in the Canadian American Coal Co.'s mine, directly under the foot of the mountain.

The steep walled summit between the remaining north and south peaks is very badly shattered, as the result of the shock received during the slide. The south peak for 300 yds. back has dropped bodily 20 ft., and is traversed by open fissures, from a few inches to 20 ft. wide. The greatest movement has been in the central area between the two peaks. This is completely covered by gaping fissures into blocks which have tilted forward 10 to 20° from their original position, some of them dropping in the process 100 ft.

Numerous fissures extend down the shoulder, running west from the north peak for at least 500 ft. The shoulder of the mountain running east from this peak and which frowns down upon the town is very steep. To its solidity Frank and its inhabitants owe their preservation. It withstood the concussion of the breaking away of the mountain mass, and, acting like the side of a funnel, prevented the loosened material from spreading over the town. The mouth of the mine tunnel and the cottages at the south end of the town are threatened by the loosened masses on the North Peak.

The chief danger is apprehended from the fissures behind and west of the North Peak, for the safety of the town depends upon the stability of the protecting shoulder. To all appearances it is still secure; but the fractures which were found 500 ft. west of the peak and which on account of fresh snow could not be followed northward may extend so far in this direction as to loosen the whole of this shoulder of the mountain. If the town is to remain inhabited in its present position, these northerly fissures must be closely watched. They are not likely to open out or extend suddenly, and for this reason no immediate danger to the upper portion of the town is feared. If, however, any signs of slipping in the fissures some distance back of the face of the North Peak are detected, the town ought to be at once evacuated.

The fractured mass surmounting the former break is bound to fall away, but whether it falls gradually and in comparatively harmless blocks, or in large destructive masses, depends upon future conditions which cannot be foretold. The town of Frank might possibly exist on its present site unharmed for ages. But the fact that the threatening shoulder withstood the first slide is no proof that it is too solid to fall. The same conditions exist on the North Peak and this shoulder to-day as obtained on the summit before it fell. A recurrence of seasons with unusual precipitation and rapid temperature changes, a slight earthquake shock or the closing of the chambers in the mine after the coal has been drawn, perhaps long after the inhabitants have lost their dread of the mountain, may give the impulse which will dislodge this mass and start it on a career of devastation. Since this possibility must always overhang the town, it would seem advisable to move it a short distance up the valley beyond the reach of danger.

## THE MANUFACTURE OF CEMENT FROM MARL AND CLAY.*

By Henry S. Spackman, M. Am. Soc. M. E.†

The chemical elements necessary for the manufacture of Portland cement are lime, silica, and alumina, the last two being generally supplied by some form of clay or shale, the average ratio being one part clay to four parts carbonate of lime. In the United States the lime used in the manufacture of Portland cement is found in several forms, which may be classified under three general groups, argillaceous limestone, marl, and limestone, the latter group being capable of considerable subdivision.

Considering these in the order of their relative importance in the cement industry, the argillaceous limestone is easily first, although its supremacy is threatened, the output decreasing from [illegible]% of the production of the United States in 1900 to about 60% of the estimated production for 1902. The principal deposit of this material is found in eastern Pennsylvania and New Jersey. The most eastern development is at New Village, where the Edison Portland cement works are located. The Vulcanite and Alpha works are a little south and nearer the Delaware River. The next development is at Nazareth, where a number of works are in operation and in course of construction, and the deposit can be traced across the country to the Lehigh River at Siegfried. Here are located the various works of the Coplay, Atlas, American, Lehigh, Lawrence, Whitehall, and Bonneville cement companies. There is no development of the deposit between here and the works of the Reading Cement Co. at [illegible], which

FIG. 4. SOME OF THE ROCKS WHICH CAME DOWN WITH THE SLIDE.

FIG. 5. VIEW NEAR THE LOCATION OF THE FORMER MINE ENTRANCE, SHOWING OLD MAN RIVER.

(At the point marked X the 17 miners finally escaped after driving a [illegible]-ft. shaft upward from the main tunnel. At the point XX, a rescue party dug all day in the hope of reaching the miners.)

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*Extract from a paper in the Proceedings of the Philadelphia Engineers' Club for April, 1903.

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